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THE
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FINLAND: THE LAND AND THE PEOPLE*

By ERLAND NORDENSKIÖLD
Göteborg Museum

The Finnish race has been bred in the school of adversity. There is no other civilized race that in its entirety dwells so far north. The climate of Finland is severe, the land is poor. Furthermore, the Finns have suffered from the disadvantages of their situation as a small buffer nation. Their country—128,600 square miles in size, about twice as large as New England—is sandwiched between Scandinavian and Slav peoples, with both of whom the Finns are ethnologically unrelated.

The People

RACIAL DISTRIBUTION

The Finns belong to the Finno-Ugrian stock and are most closely allied to the Esthonians and Livonians on the Baltic, more remotely with the Finno-Ugrian stocks on the Volga and in the Ural Mountains. From early times the Finns have formed the great majority of the population of Finland: the minority is almost entirely Swedish. In 1910 these two groups formed 99.6 per cent of the total population of 3,115,197, of whom 88 per cent spoke Finnish and 11.6 per cent Swedish.[1] Their geographical distribution is shown on the accompanying map (Fig. 1). In the north of the country there is a small number of Lapps—about 1,300. The number of Russians is also insignificant. In 1900 there were only 5,939 Russians in Finland. During the following years and up to the time of

* This article should be compared with "The Finn in America" by Eugene Van Cleef, published in the *Review*, Vol. 6, 1918, pp. 185-214. Mr. Van Cleef institutes a comparison between conditions in Finland and northeastern Minnesota, where the majority of Finns in the United States are to be found.—EDIT. NOTE.

1 "Statistisk Årsbok för Finland, 1917," Helsingfors, 1918. Most of the statistics given in this article are taken from this annual. Other data are drawn for the most part from the "Atlas de Finlande," 1910, 1 vol. of maps and 2 vols. of text, Société de Géographie de Finlande, Helsingfors, 1911. A summary of the text by J. Poirot, the French translator, appeared in *Ann. de Géogr.*, Vol. 22, 1913, pp. 310-325 and 417-426.

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the Russian revolution of 1917 their number had increased considerably, owing to the stationing in Finland of large numbers of troops.

Over 3,000,000, or almost the whole population of the country, are Lutheran. Only about 50,000 are Greek Orthodox. These figures show how unwarrantable, from the point of view of ethnology and religion, has been the subjugation of Finland by Russia. As regards culture and tradition this is no less true. The entrance of Finland into the ranks of the free nations should therefore be welcomed by all who cherish the principle of the right of small nations to control their own destinies.

The Settlement of Finland

Finland was inhabited as far back as the Stone Age, of which period considerable finds have come to light. It is interesting to note that implements from that time are lacking in a broad belt of coast land, particularly along the Gulf of Bothnia. Here the land is constantly being reclaimed from the sea by a steady elevation. During the last hundred years these coasts have risen from four to five feet, and the movement seems to have been in progress since the Stone Age. That part of the population that lived on the coast, either on the skerries or at the mouths of the rivers, has been constantly compelled to shift quarters as the sea receded, a circumstance that is confirmed by the position of the finds. The oldest types of implements are to be found in the uplands, while the more recent ones occur relatively more frequently at the lower than at the higher levels.

The first settlement of Finland seems to have been effected from two directions, in the southwest from Uppland in Sweden and in the southeast from the districts round Lake Ladoga and Lake Onega. In the southwest there lived, presumably dating from the Stone Age, Scandinavians (Swedes), who were probably far more numerous in Finland than they are today. It is not known with certainty what stock it was that migrated to Finland from the Ladoga and Onega districts. As far back as the Bronze Age, of which period, however, there are few finds in the country, the west of Finland seems to have had a Scandinavian population, the east a non-Germanic stock. Even during the earlier phases of the Iron Age the Scandinavian population in Finland was presumably very considerable. From the beginning of the later Iron Age (700 A. D.) the Finns appear to have been established in the country. Old names became Finnicized, Scandinavian antiquities diminished in number and disappeared. Only in certain parts, particularly on some sections of the coast and on the Åland Islands, did an unmixed Swedish population remain.

Relations with Sweden and Russia

In the twelfth and thirteenth centuries the Swedes repeatedly made crusades against Finland and finally conquered the country. It remained

a Swedish province until 1809. Many Swedes removed to the coast districts of Finland, especially to Österbotten, fronting on the northern three-quarters of the Gulf of Bothnia. During this period the history of Sweden is the history of Finland too. In common with the Swedes, Finns fought under Gustavus Adolphus and Charles XII.

From Sweden Finland received her religion and her political institutions. The whole country has been leavened with Swedish culture.

By reason of her position as a border province Finland was devastated several times by the Russians, especially in the earlier years of the eighteenth century. In two wars that were disastrous for Sweden parts of Finland were lost to Russia during this century. Finland was finally conquered by Russia during the Napoleonic wars. By the Treaty of Fredrikshamn in 1809 Sweden ceded Finland and the Åland Islands, which were united in a kind of personal union with the Russian Empire, that is as an independent state. Respected at first, this independence has been almost completely suppressed during recent years. Before the declaration of independence in 1917 Finland was all but a Russian province. However, in spite of all attempts at Russification, Finland remained faithful to and developed her Western culture, and her cultural relations with Sweden continued to be very considerable. The cultural influence of Russia on Finland was, on the other hand, practically nil. The threatened invasion of Bolshevism in 1918 was the first occasion in history that an intellectual movement coming from the East was of significance to the Finlanders.

It may be said that the Swedish element was completely dominant in Finland, politically, economically, and culturally, up to the end of last century. Since then the Finnish element, among whom a national consciousness began to develop in the earlier half of the century, has risen to a powerful position. The linguistic struggle in Finland has often been bitter and severe; yet it is noteworthy that the Swedish and Finnish populations have never fought each other with any weapons but the pen. It is also noteworthy that the leaders who have worked for the progress of the Finnish-speaking population towards social and political maturity were Swedes, and that those who have advanced the studies of the Finnish language and literature were also in the first place Swedes. Finland is still a country of Swedish culture, even though the linguistic medium is preponderantly Finnish.

The Swedish weft in the population of Finland is, however, more important than would appear from the present extent of the Swedish language. This is shown by the anthropological investigations made by Westerlund and others in regard to the length of the body, the shape of the skull, etc. The Finnish-speaking inhabitants of southern and western Finland are much closer to the Swedish type in these respects than are the Finns living in the northern and eastern parts of the country. In

FINLAND : ETHNOGRAPHY
Scale 1:10 800 000
Based on Debes's Handatlas, 1913, Pl. 12 c, and Atlas de Finlande, 1911, Pl. 46
Norwegians
Swedes
Finns
Lapps
Karelians
Esthonians & Livonians
Baltic Finns
Lefts
Lithuanians
Great Russians
White Russians
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ARCTIC OCEAN
North Cape
BALTIC SEA
GULF OF BOTHNIA
GULF OF FINLAND
WHITE SEA
Gulf of Archangel
Lake Ladoga
Lake Onega
KOLA PENINSULA
LAPPLAND
NORRBOTTEN
ÖSTERBOTTEN
VÄSTERBOTTEN
ESTHONIA
LIVONIA
Gulf of Riga
PETROGRAD
VITEBSK
KOVNO
NOVGOROD
PSKOV
TVER

FIG. 1.

FINLAND : POPULATION DENSITY
Scale 1 : 10 800 000
Based on Debes's Handatlas, loc. cit., Petermann's Mitt, Vol 59, 1913, I, Pl 2, and Atlas de Finlande, 1911, Pl 25
Practically uninhabited
<1
1-10
10-25
25-50
50-75 per sq. km.
<2.6
2.6-26
26-64
64-128
128-192 per sq. mile
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WHITE SEA
Gulf of Archangel
Gulf of Riga
Lake Ladoga
Lake Onega
North Cape
LAPPLAND
KOLA PENINSULA
ULEÅBORG
VASA
HELSINGFORS
PETROGRAD
ESTHONIA
LIVONIA
VITEBSK
NORWAY
SWEDEN

FIG. 2.

the south and west we find the greatest average height and relatively the greatest number of persons with dolichocephalic skulls. Like the Swedes, most Finns have light or blue eyes. Of the Swedes 52 per cent have blue eyes and 30 per cent light; for the Finns the corresponding figures are 45 and 33.

Distribution of Population

Compared with most countries of Western Europe Finland has a scanty population: the average density is 25 per square mile (see map; Fig. 2).

Fig. 3—Pyynikki, a moraine ridge near Tammerfors. Such forested moraine topography is typical of a great part of the country. (Courtesy of Herman Montagu Donner.)

The government of Uleåborg, constituting the northern half of the country, has, because of its greater elevation, colder climate, and scanty resources, only 5 to the square mile. A density of 93 per square mile is found in Nyland, fronting on the western part of the Gulf of Finland, the smallest and the richest of the governments. The detailed distribution of population is interesting. It is beautifully shown in a series of maps on Plate 26 of the "Atlas de Finlande." Just as in the Stone Age, the settlements follow the watercourses, the natural existent means of communication. Even in more thickly inhabited parts the population is scanty away from the watercourses. In the skerries of the southwest and in the maritime district of Saima the great wealth of waterways leads to an even distribution of the dwelling places. In Österbotten, around Åbo, and on the isthmus of Karelia they form, as it were, long narrow strips defining the

more fertile river valleys. Small as the population is, it has shown a very considerable increase in the last fifty years.[2] From 1865 to 1908 the annual increase has been 1.15 per cent. This increase is accounted for in considerable part by the growth of industrialism. Before 1865 the natural increase was mainly contributed by the agricultural class. In 1900 only one-tenth of the increase in population could be classed as agricultural. The north also has enjoyed a large increase during the last few decades, owing to the work undertaken in the great forests. Growth of the towns has kept pace with industrial development. It has been estimated that

FIG. 4—View seaward from the coast near Hangö. Hangö lies on a sand-covered gneissic peninsula which forms the southwesternmost point of the Finnish mainland and leads over to the island clusters of the skerries.

4 per cent lived in towns in 1650, 6.4 per cent in 1850, and 15.5 per cent in 1915. The capital, Helsingfors, had 21,000 people in 1850, 94,000 in 1900, and 176,521 in 1915.

EMIGRATION

As in Sweden, increase of population has been checked by emigration. This was slight before 1880, but has since increased considerably. In 1902, the record year, 23,152 persons emigrated; from 1893 to 1909 emigrants numbered 119,919 men and 67,963 women. Of these about three-quarters were drawn from the agricultural population, and not less than 25 to 31

[2] Sweden, together with Finland, has had reliable population statistics ever since 1749, a distinction to which no other country can lay claim. In 1749 Finland had 534,065 inhabitants; in 1915 there were 3,300,650.

per cent were peasant proprietors with their children. A good part of the emigrants were Swedish Finlanders from Österbotten, belonging to the most industrious and capable element in the community. The majority emigrated to North America.[3] A large number of these emigrants left their country on account of the illegal conscription imposed by the Russian authorities. Another reason for emigration lies in the poverty of the country. The proportion of persons engaged in industry is still small, and Finland cannot support its population on its own produce.

The Land

Finnish Agriculture and Its Basis

The country is a low plateau of crystalline rock exceedingly accidented in detail as a result of glacial action on an already irregular and fractured surface. A morainic mantle covers at least four-fifths of the land. Lakes abound, especially in the eastern part of the country. Most abundantly watered is the administrative district of St. Michel, with 29 per cent of water. In relation to its extent Finland has been estimated to have one-third more inland water than Sweden, three and a half times as much as Norway or Switzerland, ten times as much as Germany, and forty times as much as France. The only region really comparable with Finland in this respect is the Laurentian Plateau, in which are areas with 25 per cent water surface.

It has already been remarked that the climate is severe. Actually in Finland, as in Norway and Sweden, it is not as rigorous as in other countries of the same latitude (approximately 60° to 70°) by reason of the tempering influence of the warm southwesterly winds. Compared with the mean annual temperature prevailing in lands between the 60th and 70th parallels that of Finland is about 6° higher. Naturally the country shows a considerable range of mean annual temperature between its northern and southern limits. While the mean annual temperature at Åbo in the south is about 40° F., in Finnish Lapland it is 27° F. The difference between east and west is also marked: the west on account of its exposure to maritime influence is 3.5° warmer than the east. Sudden changes of temperature are common and, especially in spring and early summer, are likely to be disastrous, the crops over great parts of the country being frequently destroyed by night frosts.

The Crops

In consequence the harvests vary a great deal from one year to another. Crop failures and famines have not been rare. The year 1867 was one of fearful dearth. The rye crop was then less than 2,000,000 hectoliters, whereas a year or two later it was over 4,500,000. In 1889 the potato

[3] See Eugene Van Cleef: The Finn in America, *loc. cit.*

crop was over 7,000,000 hectoliters; three years later it was below 4,000,000. During the great war, too, the Finns have had a bitter experience of what famine means. Latterly more attention has been given to the cultivation of oats than to that of rye, because of the increased possibilities of importing breadstuffs, and because oats are hardier against frost.

The acreage devoted to oats much exceeds that given to rye, but the oat crop is partly destined for fodder. Rye still remains the principal crop grown for human consumption. It is cultivated up to latitude 64° and in favorable years it ripens up to 67°. Barley is grown up to latitude 68°. This northerly extension of cultivation is in part due to the accumulated temperatures gained in the long daylight periods of summer in this land of the midnight sun. Whereas in the Åland Islands barley takes 116 days to ripen, in the higher latitudes not more than 63 days are counted on between sowing and harvest. Oats are common up to latitude 64°. Wheat is sparsely cultivated, and only in the south. Next to rye, potatoes are the most important foodstuff grown.

Even in normal years the soil does not yield sufficient breadstuffs to support the population. The following table shows the produce of the country compared with the imports between 1896 and 1905.

AGRICULTURAL PRODUCTION AND IMPORTATION OF FINLAND, 1896–1905

(*Amounts in millions of kilograms*)

PRODUCT	AVERAGE ANNUAL HARVEST		IMPORTS	
	1896-1900	1901-05	1896-1900	1901-05
Wheat	4.17	3.32	84.19	111.93
Rye	312.78	274.06	244.00	355.07
Barley	110.32	101.35	16.89	19.79
Oats	367.41	297.5	12.15	22.44
Potatoes and other root crops	446.18	517.26	7.34	8.01

In recent years a great deal has been done for the improvement of agriculture. Throughout the farming country there are agricultural schools and colleges. Cattle breeding is of the greatest importance. In 1907 there were 1,100,000 cows in the country (i. e. 374 cows per 1,000 inhabitants). Butter to the amount of 20,000,000 to 30,000,000 pounds is exported annually, chiefly to England, in which country, however, it is known rather as "Danish" than Finnish. In the improvement of butter making a great part has been played by co-operative activity. In 1914 Finland had 395 co-operative dairies.

Half the population of Finland lives by agriculture or cattle raising, but as yet only 8.6 per cent of the land is under cultivation or pasturage. Finland has undoubtedly much cultivable ground which has not yet been utilized. It is estimated that no less than 31 per cent of the land surface is covered by peat bog and marsh. By drainage it would be possible to bring vast districts under the plough.

Furthermore, the distribution of the land in certain parts of the country

is not what it might be; large holdings are too numerous and too important, although extremely large estates (*latifundia*) do not exist. Properties with about 2,000 acres of arable land under cultivation are the largest, and even the big landowners practically always live on their estates. Characteristically the Finland of law and order has found its best bulwark against Bolshevism, outside of the educated classes, in the peasant proprietors.

The National Riches: Forests and Falls

Climate and soil in Finland are favorable to forest growth, and the country is to a large extent covered with woods, in which pine, fir, and birch predominate. From time immemorial forests have played a great

Fig. 5—Borgå, a typical small town in the southern part of the country near the Gulf of Finland.

part in the history of the inhabitants. By burning woodland they obtained the ash necessary for fertilizers. For a long time the cultivating of grain was only possible by this process, and even today the same procedure is carried out in the most easterly districts.

The chief national riches of the country lie in its forests and waterfalls. From the beginning of the industrial period forest resources have been commercially exploited. Timber exports have given Finland the necessary economic foundation without which transportation and public instruction could not have been developed as they have been during the latter part of the nineteenth century and the beginning of the twentieth. In 1913 wood and wood products formed 75 per cent of the exports of the country, of which the total value was 404,000,000 Finnish marks (francs).

In one industrial factor Finland appears to be deficient. Mineral resources, so far as is known, are inconsiderable. It has been recently stated that the Swedish ore fields in Lapland should have corresponding fields in Finnish territory. Some reconnaissance work has been reported, but as yet one cannot speak of it with authority.

It is Finland's great wealth of water power that gives the country its chief possibilities in industrial development. The hydrographic system of the interior, especially of the Lake Plateau, is exceedingly complex. Characteristically elongated lakes are united by a more or less considerable river, which, before it reaches the sea, flows through a tract of few lakes with a copious wealth of rapids. The largest fall in Finland is Imatra, famous for its natural beauty. Its water power is placed at 80,000 horse power.[4] The total water power of the country is estimated at not quite 3,000,000 horse power, by no means all of which, however, can be used for industry. In 1911 about 100,000 horse power was in use, but this is only a small proportion of what is available.

FIG. 6—Tammerfors, the largest manufacturing town in Finland. The town lies on a stream forming the main southwestern outlet of the Finnish Lake Plateau, with a fall of 60 feet in one mile. The waterpower thus generated is utilized by its paper, cotton, and linen mills.

The Vuoksen River, the outlet of the Saima lake basin to Lake Onega, has available 435,000 horse power at low water. But as much of this power now goes to waste as is used in all Finland. Of the power utilized, the greater part (about 80 per cent) is employed by paper works.

The value of the output of the various Finnish industries in 1913 was 750,000,000 Finnish marks. Workmen employed in industry in 1913 numbered 109,238.

COMMUNICATIONS BY LAND AND WATER

The Finlanders have not neglected to use their financial resources, which, in their small way, are good, for the purpose of developing communications and public instruction. Finland has the best highroads of all countries situated in the same latitude. Whereas in the days of Gustavus Adolphus the roads were like the present roads in northeastern Bolivia,

[4] See the note on "The Utilization of Imatra Fall, Finland, for Hydro-Electric Power," *Geogr. Rev.*, Vol. 4, 1917, p. 399.—EDIT. NOTE.

FIG. 7.

FIG. 8.

FIG. 7—A characteristic view of the Finnish Lake Plateau (in the central part, near Kuopio). Lake Kallavesi in the distance.

FIG. 8—A Finnish inland waterway. In the foreground the canalized portion of the river (above the Koivukoski Falls at Kajana in the northern part of the Lake Plateau).

(Figs. 7 and 8 reprinted from Figs. 36 and 37 in Dominian's "The Frontiers of Language and Nationality in Europe," Amer. Geogr. Soc., New York, 1917.)

FIG. 9.

FIG. 10.

FIG. 9—Olofsborg, a medieval castle of the Swedish period near the town of Nyslott in the southeastern part of the Lake Plateau.

FIG. 10—Imatra Fall, the largest rapids in Finland, generating 80,000 horsepower. The Vuoksen River, in which the rapids occur, is the main southeastern outlet of the Lake Plateau and decends from a level of 255 feet to one of 16 feet. The rapids themselves have a fall of 65 feet in a distance of 1,060 feet. The waterpower of Finland's streams, due to the undeveloped drainage of her glaciated surface, is one of the country's most important economic assets.

for example, road making was considerably developed during the latter half of the eighteenth century and still more developed during the last century. The highroads are estimated at nearly 17,000 miles in extent, and the village roads at 10,400 miles. This road building has of course been expensive in so thinly inhabited a country, as experience in pioneer America may well suggest. Characteristic of Finland are the so-called winter roads, which are used when the lakes are frozen over. By traveling partly by land and partly on frozen lakes long detours can be avoided.

The numerous watercourses in Finland have been of extreme importance as highways of communication ever since the Stone Age. For centuries their improvement has been a matter of concern. Certain canals date back to the Middle Ages. The crowning work of improvement, however, is the Saima Canal. The Saima system of lakes, covering 26,000 square miles, 23,200 of which are in Finland, is the greatest in all Europe. Direct connection of this system with the Gulf of Finland, first contemplated in the sixteenth century, was achieved in the middle of the nineteenth. By means of other canals its most distant parts have been rendered easy of access, and it thus affords an outlet of incalculable economic importance for a great part of southeastern Finland. In other systems of lakes, too, canal works have been carried out on a considerable scale.

The first railway for general traffic was opened in Finland in 1862. In 1915 the total railway mileage was 2,500. If we compare the length of the railways with the population of the country, Finland is on a par with such progressive countries as France, Great Britain, and Belgium, and this in spite of the obstacles to railway construction presented by unfavorable topography and climate.

The Finnish mercantile marine consisted in 1914 of 3,384 sailing vessels of 389,758 tons, and 638 steamships of 82,133 tons. Prior to the great war Finnish ships kept up regular communications with Stockholm, Lübeck, Stettin, Copenhagen, Antwerp, Hull, London, Havre, and Bordeaux. They sailed, of course, under the Russian flag, so that their Finnish nationality would hardly be noticed. The long indented seacoast, with its innumerable havens and its fisheries, has naturally bred a race of sailors. Finns are excellent seamen, and many of them serve in foreign navies, where they have the reputation of being capable and honest, though somewhat hot-tempered.

Education

While Finland still belonged to the great Russian Empire it was unquestionably the part of that domain where most was done for education of all grades.[5] In 1915 there were 3,250 national schools in Finland in the rural districts. All these national schools are mixed schools. In that year, in the rural districts, 51 per cent of all children of school age

[5] See Arthur Reade: Finland and the Finns, New York, 1915, pp. 178-194.

attended some national school. But the ability to read and write is considerably greater than these figures suggest, owing to widespread home teaching. Practically every Finlander can read, and most of them can write. It is chiefly in the remote, thinly populated parts of the country that the number of children not attending any school is considerable. All children living in towns receive school instruction.

Secondary education in Finland is on the same high level as in the other Scandinavian countries and in Holland. It is of interest to note that during the last few decades the Finnish-speaking element that has had the benefit of secondary education has grown larger and larger. In 1880-1881 pupils in the Swedish-speaking state institutions numbered 1,764; in 1908-1909, 1,771; the corresponding figures in the Finnish-speaking institutions were 786 and 4,756 respectively. In the higher Swedish-speaking state schools for girls there were 784 pupils in 1890-1891 and 1,042 in 1908-1909; the corresponding figures in Finnish-speaking schools were 618 and 2,483.

Finland has now two universities, Helsingfors and Åbo. The former was founded in 1640 in Åbo and was moved to Helsingfors in 1827, when Åbo was burned down. The new University of Åbo, intended only for the Swedish population of the country, was instituted in 1918 with the well-known sociologist, Professor E. Westermarck, as president. At Helsingfors there were 3,435 students in 1915, of whom 799 were women. Standards at the Finnish university are on the same high plane as in the Scandinavian countries. It can boast, among other things, of having produced an incorruptible body of judges. The Scandinavian countries, moreover, have to thank the Finnish medical faculty for the fact that cholera, which appears every summer in Petrograd, has not spread westward. Rabies, which is so common in Russia, is unknown in Sweden, thanks to the hygienic shield Finland forms against the East.

From the University of Helsingfors have also come men whose names are world-renowned, such as Runeberg, the poet; Adolf Nordenskiöld, the first man to sail around Europe and Asia; and Westermarck, the sociologist, author of "The History of Human Marriage."

As is natural, Finnish philologists and ethnologists have concentrated their energies mainly on the Finnish language and Finnish culture in and out of Finland. The impulse was given to the work by Elias Lönnrot's discovery of the great epic of the Finns, the Kalevala, the first version of which was published in 1835. The influence of the great epic as a source of spiritual inspiration to the National movement has been most profound. The folklore material collected in Finland is enormous; in 1907 it embraced 310,000 items—legends, sagas, proverbs, etc.—from the Finnish-speaking population; of the folklore written in Swedish 39,158 items had been recorded up to the same date.

The Future of Finland

The Finns, as has been seen, have a country with a geographical position that in many respects is little to be envied. But the race has striven honestly and patiently to acquire and develop Western culture. If principles of justice win the day in this world, Finland can look forward to a happy future. She has certain boundary questions, though they are not quite as acute as those of most of the other newly freed nationalities of Europe. The eastern boundary is unfortunately not ethnologically correct. A considerable part of what is still Russian Karelia is inhabited by Finns (see Fig. 1), who have shown strong sympathies for union with Finland especially in quite recent days.[6] On the other hand, the purely Swedish population on the Åland Islands has been practically unanimous in desiring to be reunited to Sweden.

Once again it may be emphasized that Finland is permeated with Swedish culture. The majority of the leading men still have Swedish as their native tongue. Mannerheim, to quote but one example, the regent whose sympathies are so strongly with the Entente Powers, is a Swedish Finlander. Yet the Finnish element is coming more and more to the front, a fact that is not surprising when we remember that it forms the predominant majority of the population and that, in cultural respects, it is on a level with the Swedo-Finnish element. It is to be hoped that this Finnish element will go on adding to the edifice of culture which has been building for centuries, despite frost and famine and the ever-threatening trouble from the East. It is likewise to be hoped that in the days to come Finland will know how to apply to the minority within the confines of the country the principle that it claims should be applied to their country in its entirety, viz. the right for small peoples to live their own life. In a broad sense Finland is the outpost of civilization against the East, for Scandinavia, and thereby for the West.

[6] Russian, or Eastern, Karelia embraces a belt of land 60 to 150 miles wide extending from Lake Ladoga to the White Sea. It belongs to the geological and botanical province known as Fenno-Scandia (Scandinavia without Scania, Finland, Russian Karelia, and the peninsula of Kola). A heavily forested land, it has been very isolated. This condition of economic backwardness has, however, been removed by the construction of the Murman railroad, which runs through the territory (see "Russia's War-Time Outlets to the Sea," with map, 1:24,500,000, *Geogr. Rev.*, Vol. 1, 1916, pp. 128-132). About half the population is of Finnish stock, the Finnish element especially predominating in the western part of the region. The Karelians live under primitive conditions, and such modern civilization as exists is Russian in character. The region has never belonged to Finland or Sweden, and its outlook is toward the East, whereas that of Finland is toward the West.—Edit. Note.

THE TIOGA ROAD ACROSS THE SIERRA NEVADA

By CHARLES J. BELDEN

The remarkable system of wide, well-graded Alpine highways of Europe and particularly those of Switzerland and Italy, afford ample suggestion

FIG. 1—On the Tioga Road: An alpine meadow nestling close under snow-capped peaks. (All photos by the author.)

that we also should pay attention to the conservation and utilization of natural scenic attractions along our own mountain roads. Threading back

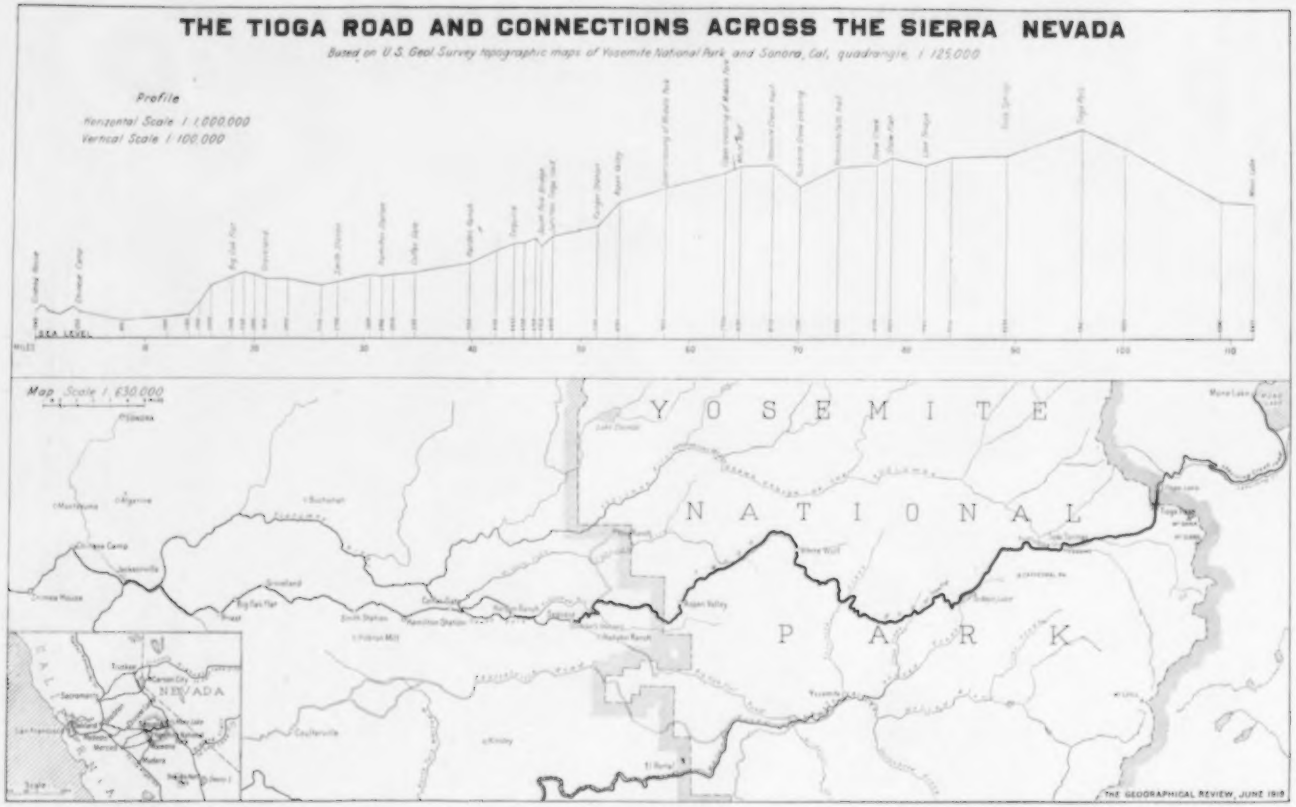

FIG. 2—Map (scale, 1:630,000) and profile (horizontal, 1:1,000,000; vertical, 1:100,000) of the Tioga Road and connections across the Sierra Nevada. (On the profile, at Mile 66, insert Yosemite Creek divide, elevation 8,550 feet.)

and forth across the snow-capped Alps, these substantially built roads have given enjoyment to countless millions of travelers from all parts of the globe. In time of war these same roads have been of inestimable value in transferring armies and supplies quickly and efficiently and have proved their value many times over.

The Tioga Road

In our own country the roads that penetrate regions of scenic grandeur are not widely known and are not sought after as travelers seek the St. Gotthard or the Stelvio roads, often journeying thousands of miles for the privilege of traversing these and other equally famous mountain routes. Crossing the Sierra Nevada Mountains just to the north of Yosemite Valley is a road recently opened to the public for general travel that bids fair to attain some day a world-wide reputation. The Tioga Road, as it is called, penetrates the most superb of the scenic grandeurs of the Sierras and offers to the gaze of the wayfarer an array of rugged granite peaks that would satisfy the most *blasé* alpinist.[1]

Its Construction and History

The Tioga Road was constructed in 1882 by the Great Sierra Silver Mining Company for the purpose of transporting supplies to their mine in the very summit of the Sierras, and it has had a rather romantic and variegated history. The name "Tioga" was taken from Tioga County in New York, the home of the man who located the mine. The road was skillfully laid out, the construction being of a character unusually permanent for mountain roads in California. The bridges were all put in with fine stone abutments, and retaining walls were built wherever there was the least necessity for them. The surfacing of the road was exceedingly good, and altogether the original builders spared no expense to make this a model mountain thoroughfare. Chinese labor was used to a large extent, and the entire cost was very close to $61,000, or approximately $1,000 a mile.

The road had barely reached completion when the mine proved to be a losing venture and was abandoned. Almost $1,000,000 was spent in this undertaking, which only added another chapter to the history of the many financial tragedies of Western mining.

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[1] References to the Tioga Road will be found in the following official publications:

General Information Regarding Yosemite National Park: Season of 1918. 47 pp.; with automobile map of the park, 1:375,000, and tables of distances. National Park Service, U. S. Dept. of the Interior, Washington, D. C., 1918. Reference on p. 8.

[Second Annual] Report of the Director of the National Park Service for the Fiscal Year Ended June 30, 1918. 284 pp. U. S. Dept. of the Interior, Washington, D. C., 1918. Reference on pp. 47-48.

R. S. Yard: The National Parks Portfolio. 11 Sections of views. National Park Service, U. S. Dept. of the Interior, Washington, D. C., 2nd edition, 1917. Reference in Section on Yosemite, pp. 16-17.

As to maps see—

Topographic Map of Yosemite National Park. 1:125,000. Contour interval, 100 ft. U. S. Geol. Survey, Washington, D. C., 1915.

Panoramic View of Yosemite National Park. 1:190,000. U. S. Dept. of the Interior, Washington, D. C. [Map in realistic coloring.]—Edit. Note.

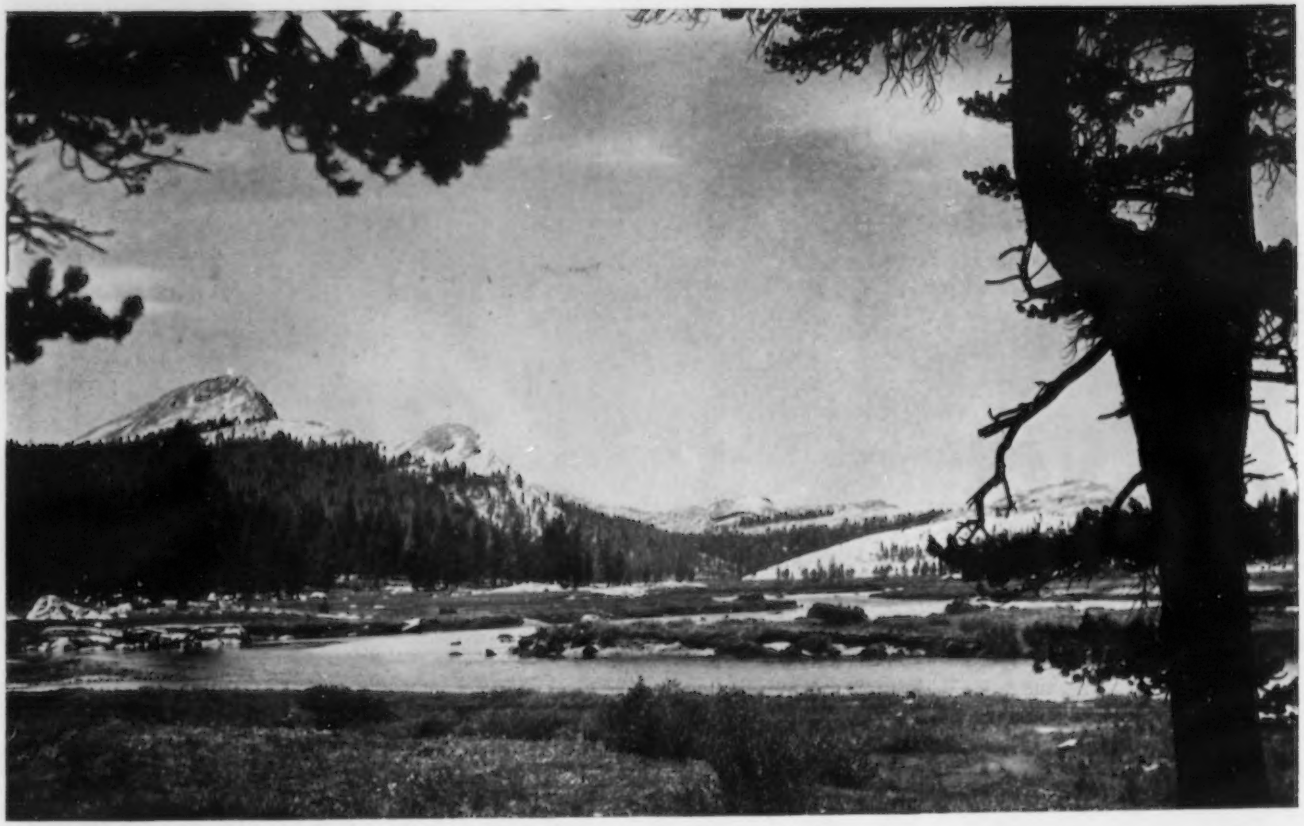

FIG. 3—The flowery expanse of Tuolumne Meadows.

FIG. 4—View from the summit of Tioga Pass, 9,941 feet in elevation.

The road remained in a state of neglect for a great many years and was practically impassable for any kind of vehicle. As it was private property the Government could not improve it, and the owners were not disposed to maintain it although they professed to do a certain amount

FIG. 5—Freight team on the Tioga Road. The road was originally built for twelve- and sixteen-horse freight teams.

of work each year. The heirs of the property offered it to the National Government and to the State of California at a constantly reduced figure as the years went by, and from time to time various Secretaries of the Interior recommended its purchase, but nothing definite resulted. Several bills were also introduced into Congress providing for the purchase of the road, but they never became law.

ITS ACQUISITION BY THE GOVERNMENT

The importance of the Tioga Road had been recognized for some time, not only as a means of establishing a new route across the mountains and

opening up the northern part of the Yosemite region but also as a connecting link of unsurpassed scenic quality for transcontinental automobile travel. In 1915 the road was finally acquired by a group of patriotic citizens, headed by Stephen T. Mather of Chicago, and deeded over to the

FIG. 6—The main crest of the Sierra Nevada from the Tioga Road.

Government. In July of the same year, through the co-operation of the U. S. Department of the Interior and the Department of Engineering of the State of California, this remarkable highway was opened to motor-car travel.

FROM SEQUOIA TO YOSEMITE CREEK

The Tioga Road, as originally built, had its initial point at Sequoia, or Crocker's Station, a familiar spot to all who have journeyed into the Yosemite by the Big Oak Flat Road. Two miles beyond Sequoia, a covered bridge spans the South Fork of the Tuolumne River. Leaving the Yosemite route at this point, the road gradually ascends for twenty

miles through a luxuriant forest of pine, spruce, and fir interspersed with groups of the imposing sequoia. The grade is a rather remarkable one, for, although it rises from the Tuolumne River at 4,350 feet to the Yosemite Creek divide at 8,550 feet, most of it can be traveled in high gear at an easy gait. The restful beauty of this highway carpeted with fragrant needles is all-absorbing to the traveler as he winds upward through the silent forest of giant trees. Under the heat of the midday sun the life of

FIG. 7—The road leading down Leevining Canyon.

the woods is at rest, and not a sound is heard but the whir of the motor and an occasional crunch, crunch, as the wheels pass over a fallen cone.

As the road emerges above Yosemite Creek, comprehensive views of the whole upper Sierra region are obtained, framed in the drooping branches of the graceful sugar pines with their great cylindrical cones swinging at the very tips. This tree is a never-ending source of enjoyment; no two are shaped alike, and their immense arms, thrown out to form a palmlike crown, are decorated by the distinctive cones. A descent of four miles brings the road to Yosemite Creek, whose banks offer innumerable choice camping spots. Especially will the disciple of Izaak Walton be tempted to linger here.

LAKE TENAYA AND TUOLUMNE MEADOWS

The next nine miles to the summit of Snow Creek divide contains a few sharp pitches that reach twenty per cent for short distances, but the roadbed is hard and presents little or no difficulty. Although no expense

was spared originally to put a good surfacing on the road, years of neglect almost entirely effaced this part of the work, and it will take considerable time to make a smooth top again. Two miles below Snow Creek divide lies Lake Tenaya, a wonderful body of liquid blue set in a massive bowl of granite. Sweeping up from the surface of the lake great masses of rock stretch to the summits of the peaks thousands of feet above. The road hurries down to the shores and skirts the lake along an exceedingly well-

FIG. 8—Rugged granite peaks above Lake Tenaya.

built sea wall blasted from the solid rock. From the head of Lake Tenaya the route ascends eastward through a narrow gorge whose walls rise sheer on either side far into the blue of the sky. Many a diminutive waterfall is supplied from melting snowdrifts high up on the granite peaks, and each fall contributes its share to the rushing torrent beside the road.

Nine miles beyond Tenaya the flowery expanse of Tuolumne Meadows is suddenly spread at the traveler's feet. These meadows, encircled by the majestic peaks of Mt. Lyell, Mt. Gibbs, Mt. Dana, and Cathedral Peak, are far-famed as the most beautiful open land in the whole length of the Sierras. Through their center the Tuolumne River meanders in a leisurely fashion, as if gathering strength for its wild plunge through the Tuolumne Canyon into Hetch Hetchy Valley to the west.

LEEVINING CREEK

After the Meadows are traversed a gradual ascent brings the road to the summit of Tioga Pass at an elevation of 9,941 feet above sea level—the

highest road pass in the Sierras. A splendid array of rugged, wind-swept summits is presented on all sides, while on the floor of the pass a few struggling pines are fighting for their existence against the elements. After passing Tioga Lake the road follows the winding course of Leevining Creek as it threads its way through masses of curious rock formation. The huge rocks in their desolate grandeur begin to close around, when, without warning, the road plunges into the awe-inspiring depths of Lee-

FIG. 9—Lake Tenaya, set in a massive bowl of granite.

vining Canyon. A remarkable piece of engineering carries the smooth, well-graded highway hundreds of feet above the foaming creek for nine miles down the almost vertical sides of this gorge, affording views of terrifying impressiveness. The Leevining Creek road, for more than two miles cut from the solid rock, is notable throughout for the substantial manner of its construction. It was built by the State of California at a cost of $50,000, having been begun in 1901 and finally completed in 1911.

From the mouth of Leevining Canyon the road drops rapidly down to the shores of Mono Lake, the Dead Sea of the West. At this point is encountered El Camino Sierra, the road that parallels the eastern flank of the mountains, hugging close under their massive wall from Owens Lake to Reno, Nevada. Here the Lincoln Highway is joined, and the wayfarer is once more on the beaten path.

THE CLIMATE OF LIBERIA AND ITS EFFECT ON MAN

By EMORY ROSS
Disciples of Christ Congo Mission

Not the least of the pleasures of doing a bit of the more ordinary work of science in some of the tucked-away places of the earth is the fact that it has never been done before. Such a pleasure the writer has been privileged to enjoy in making a series of meteorological observations in the little-known country of Liberia.[1]

The Population of Liberia

The negro is supreme in Liberia. No one of another race may own land or vote in the republic. The ruling class is made up of descendants of American negroes who colonized there and numbers not more than 20,000 or 25,000 people. The native pagan population is variously estimated; the writer's guess is that it is about 750,000. The whites living in the republic up to the time of the country's declaration of war against Germany numbered about 200. Monrovia is the capital and largest city, with a population of 8,000—in round numbers 75 whites, 3,000 Americo-Liberians, and the rest natives.

The Coast Region

Liberia occupies the westernmost part of Upper Guinea, fronting on the Atlantic for 300 miles with a coast line extending in a northwesterly to southeasterly direction. Along practically the whole coast is a line of lagoons, lying parallel to the sea and separated from it by sand bars from 30 to 100 yards wide. Into these lagoons, which vary in length up to 15 miles and in width from 10 to 75 yards, pour numerous small creeks and the surface run-off of a limited area inland. The lagoons empty by overflow into the sea during the rainy season, at which times the outlet remains open for a fortnight or so; but aside from this there is usually no connection with salt water. Behind the lagoons—in most cases from three to six miles back from the ocean—are numerous estuaries lying parallel to the coast for distances up to 30 miles or more and connected with the sea through the mouths of the rivers proper, which enter it at intervals of about 30 miles along the coast.

This network of coastal lagoons, estuaries, and rivers has an important

[1] The mission board with which the writer was associated in Liberia had a broad, modern conception of its functions, and furnished simple equipment for various sorts of work outside the beaten paths of time-honored missionary endeavor. Acknowledgment is also made to friends who continued the writer's observations during periods of absence.

bearing on the healthfulness of the best-developed section of Liberia, the coast region.

The flat coastal belt, diversified by occasional hills of 200 to 300 feet, has an average width of about 25 miles. It is terminated by abrupt elevations that cause rapids in all the rivers, rendering further navigation impossible and limiting the advance of civilization into the interior. Rapids are repeated, and a gradual elevation is continued, through the Liberian hinterland to the crest in the western Sudan which forms the watershed between the extreme West African coast and the Niger sources.

The coastal belt has been more or less cleared of tall forest; but, except for a small extent of savana in the north, the interior is clothed in forest that in denseness and luxuriance has been said to surpass even the forests of the northeastern Congo Basin.[2] The dense forest is an index to the climate of the country, of which, however, our direct knowledge is very limited.

The Climate

Meteorological Records

In the outstanding work on the climate of Africa,[3] the author opens the abbreviated chapter on Liberia with the remark that very little is known of the climate, and thereupon he proceeds to show convincing proof of his observation. So far as the present writer is aware, the only meteorological records in existence that have been made in Liberia over a period of more than a few weeks are those begun by himself in 1913 and ended in 1915 by Mr. Lewis A. Hurt and those made by the Deutsch-Südamerikanische Telegraphengesellschaft, A.-G., between January, 1915, and Liberia's declaration of war in 1917—both of which sets of records were available in the preparation of this paper.[4] The records were obtained at points 20 miles apart, the one set at the station of the Christian Woman's Board of Missions immediately on the coast near the town of Schiefflin (Schiefflinsville) in 6° 11′ N. latitude and 10° 33′ W. longitude, and the other at the station of the German cable company at Monrovia in 6° 19′ N. latitude and 10° 49′ W. longitude. The Monrovia station was 225 feet higher than the station at Schiefflin.

Summary of the Records

The mean annual temperature was 78.5° F. The means of the warmest month (March, 80.4°) and of the coolest months (July and August, 76.4°) were respectively but two degrees above and below the annual mean. The highest recorded shade temperature was 93°. This was reached but twice,

[2] Sir Harry Johnston: Liberia, 2 vols., London, 1906; reference in Vol. 1, p. 8.

[3] Alexander Knox: The Climate of the Continent of Africa, Cambridge (Engl.), 1911, pp. 205, 206.

[4] A few observations for short periods of time are given by Sir Harry Johnston, *op. cit.*, Vol. 2, pp. 504-512. A summary of the records at Schiefflin for 1913-14 was given in the *Monthly Weather Rev.*, Vol. 43, 1915, pp. 178, 179.

during a hot spell in March and April, 1915. Aside from these two months, 91° was the highest temperature noted, and that point was reached but nine times during two and a half years' observations. All temperatures of 67° or lower occurred during the dry months of December, January, and February. The mean monthly range varied from 25° in January to 15° in August. The mean daily range varied from 18.4° in January to 9° in August. The smallest daily range was 3°, noted in July. Daily ranges as small as 5°, 7°, and 9° are common during the rainy months from June to September.

The rainy season occupied about seven months of the year, from mid-April to mid-November. During these seven months the precipitation was 170 inches out of the annual total of 179.5 inches. With the adjoining area of southern Sierra Leone, Liberia is probably the wettest part of Africa, except for one or two isolated mountains, including Cameroons Mountain. The average number of clear days per month (less than one-third cloudy) decreased from 18 in March to 1.3 in July; the cloudy days (more than two-thirds cloudy) increased from 2 in April to 24.3 in July. June was usually the rainiest month. During the first four days of June, 1914, 20.43 inches of rain fell, and on the 16th and 17th of the same month the fall was 13.25 inches. The period of longest drought ran from December 28, 1913, to February 19, 1914—a total of 54 days, during which time 0.1 inch of rain fell on the 32nd day.

During July and August there is a period of lessened precipitation known locally as the "middle drys" and well established in the oral tradition of Liberia. It is commonly expected to begin about the last week of July and to continue till the middle of August. Table VI shows how nearly it conforms to this expectation. This suggestion of the double rainy season characteristic of the equatorial regions is in accordance with the latitude (6° 11′ N.). Farther south the double maxima are more clearly marked. The régime at Bingerville and Bassam in the Ivory Coast (5° 20′ N.) is described as very rainy in May and June, rainy in October and November, with less rain in July, August, and September.[5] Farther north, in Freetown, Sierra Leone (8° 30′ N.), there is no hint of a break in the rains, the maximum occurring as a well-defined peak in August.[6]

Sensible Temperatures and Insolation

The sensible temperatures of the Liberian coast are not so high as those of many places in intermediate latitudes. The writer, at any rate, has never experienced in Liberia the sense of suffocation, gasping respiration, and general oppression that he has repeatedly felt in July and August in Indiana and Illinois, not to mention Mississippi. The sensible temperatures are not high, relatively, except in pockets cut off from the breeze and in places where a rocky surface formation adds its reflected heat. Monrovia

[5] Gaston Joseph: La Côte d'Ivoire, Paris, 1917, p. 16.

[6] Knox, *op. cit.*, p. 113.

has such a surface, but its elevation and the sea breeze tend to keep down the sensible temperature to levels found elsewhere.

Yet, while the heat is not so extremely and sharply oppressive during a given day or week as may be the case in other and more temperate regions, it is much more dangerous in its steady persistence (see Tables I and II),

TABLE I—SUMMARY OF METEOROLOGICAL OBSERVATIONS AT SCHIEFFLIN, LIBERIA, MAY, 1913, TO OCTOBER, 1915

MONTHS	TEMPERATURE (DEGREES F.)							PRECIPITATION			CLOUDINESS		
	MEAN	MEAN MAX.	MEAN MIN.	ABSOL. MAX.	ABSOL. MIN.	MAX DAILY RANGE	MEAN DAILY RANGE	TOTAL INCHES	MAX IN 24 HOURS	NO. DAYS MORE 0.01"	CLEAR	PARTLY CLOUDY 30%-70%	CLOUDY
1913													
May	**80.**	87.7	72.3	**91**	68	21	15.4	9.93	2.58	17	8	14	9
June	78.7	85.3	72.1	90	69	18	13.2	27.48	4.38	24	1	4	25
July	77.7	83.4	72.	88	68	16	11.4	30.69	6.24	**29**	**0**	0	**31**
August	77.0	81.7	72.3	86	71	14	9.4	30.07	6.16	25	3	11	17
September	**76.6**	81.7	71.6	85	68	14	10.1	23.90	3.06	26	5	9	16
October	78.6	84.7	72.6	89	70	17	12.1	24.35	4.52	26	12	14	5
November	79.6	86.6	72.5	89	70	18	14.1	8.74	2.35	15	7	17	6
December	79.9	87.8	72.	**91**	66	22	15.8	1.74	0.74	4	13	11	7
1914													
January	77.8	87.5	**68.2**	**91**	**58**	**31**	**18.7**	0.10	0.10	1	16	10	5
February	78.9	87.6	70.2	**91**	65	24	17.8	1.84	1.84	1	15	8	5
March	**80.1**	**88.2**	72.	**91**	68	21	16.2	1.29	0.48	6	18	8	5
April	79.8	87.9	71.6	**91**	70	19	16.3	8.76	2.43	14	**25**	5	**0**
May	79.4	87.3	71.6	90	69	20	15.6	19.70	3.85	23	8	22	1
June	78.	82.6	73.3	87	70	15	9.3	**50.35**	**7.50**	**29**	5	13	12
July	**75.3**	**79.3**	71.3	84	69	**12**	**8.**	13.25	3.20	23	3	6	22
August	**75.8**	80.3	71.3	85	68	17	**8.9**	14.46	2.95	20	6	9	16
September	76.8	81.6	72.1	84	69	13	9.5	26.43	3.04	**28**	6	14	10
October	78.1	83.6	72.6	87	69	14	11.	31.66	4.02	**30**	7	14	10
November	78.7	85.	72.4	88	69	17	12.6	13.90	2.50	23	12	14	4
December	79.8	**88.2**	71.5	90	**61**	**28**	16.7	4.43	2.77	8	14	15	2
1915													
January	78.7	87.8	**69.6**	90	**62**	**28**	**18.2**	0.11	0.10	2	17	10	4
February	**80.4**	**88.4**	72.3	**91**	70	19	15.4	0.38	0.14	4	12	10	6
March	**81.5**	**90.3**	72.7	**93**	70	21	17.6	2.87	0.82	7	18	6	7
April	**81.2**	**89.8**	72.6	**92**	70	21	16.8	13.53	4.20	14	8	18	4
May	**80.3**	87.3	73.4	90	71	18	14.	26.05	5.	24	6	17	8
June	78.5	83.6	73.5	87	71	15	10.1	**34.87**	**9.**	**28**	**0**	17	13
July	**76.4**	80.8	71.9	85	68	13	**8.9**	30.58	6.55	24	1	10	20
August	76.9	81.2	72.6	85	71	**11**	**8.8**	18.82	**8.20**	24	2	9	20
September	77.6	82.7	72.5	86	70	**12**	10.3	27.16	6.	**30**	2	14	14
October	79.2	85.1	73.2	88	69	18	12.	31.79	6.12	27	4	19	8

The station of the Christian Woman's Board of Missions, where the observations were made, is near Schiefflin (6°11′ N., 10°33′ W.). The instruments were exposed in a cleared space several acres in extent, 25 feet above sea level, 300 yards from the ocean, 50 feet from nearest and only adjacent building. Thermometers were in a large perforated box with double ventilated roof, 5 feet above the ground; the raingage with mouth 3 feet above the ground. The instruments were: thermometers, registered maximum and minimum, made by Taylor Instrument Companies, Rochester; raingage, Glaisher's pattern, made by Short & Mason, London. The observation hour was 5.30 P.M., Greenwich time.

Throughout the tables the mean monthly temperature is derived from the formula (mean max.+ mean min.) ÷ 2. Figures of striking significance are shown in bold-faced type.

and the cumulative effect is extremely enervating. Insolation values are exceedingly high, how high one lacks data for determining. It does not require instruments, however, to give one an appreciation of the power of the sun's rays. Negligent or ignorant exposure by a European of a bare head to the sun for periods of 2, 5, 10 minutes, and the like, has resulted at once in prolonged, pernicious fevers and sometimes in death. These cases are known as a "touch of sun" and in milder forms are doubtless

the ultimate cause of many a run of fever that baffles the doctor both as to cure and name. A sun helmet of thick pith or cork is the common headgear and is constantly worn out of doors until 4.30 or 5 P. M., during rainy

TABLE II—SUMMARY OF METEOROLOGICAL OBSERVATIONS AT MONROVIA, LIBERIA, JANUARY, 1915, TO JULY, 1916

MONTHS	TEMPERATURE (DEGREES F.)						PRECIPITATION (INCHES)			PRESSURE (INCHES)
	MEAN	MEAN MAX.	MEAN MIN.	ABSOL. MAX.	ABSOL. MIN.	MAX. DAILY RANGE	TOTAL	MAX. IN 24 HOURS	NO. DAYS MORE 0.01 mm.	
1915										
January	78.3	84.4	72.	86.	**65.3**	**19.1**	**0.02**	0.02	1	29.91
February	79.3	84.7	**74.1**	87.8	71.6	14.8	**0.08**	0.05	2	29.91
March	**80.8**	**87.1**	74.5	89.8	69.8	17.1	6.36	1.82	10	29.93
April	**81.1**	**87.1**	75.2	**90.**	71.2	17.5	8.27	2.29	15	29.93
May	79.7	85.5	73.9	88.7	70.7	16.	21.13	4.50	21	29.96
June	77.7	81.7	73.8	87.1	70.3	13.3	**31.65**	5.26	**30**	**30.03**
July	**76.1**	**79.7**	72.5	84.7	68.9	**11.1**	28.95	5.36	26	**30.05**
August	**76.5**	**79.7**	73.	83.3	71.2	11.3	15.36	3.	19	**30.04**
September	77.	81.	73.	84.2	70.	13.3	**33.55**	5.18	**28**	**30.**
October	78.8	85.8	73.4	86.2	68.2	18.	29.40	**6.04**	27	29.98
November	78.6	84.2	72.9	87.4	68.2	18.	5.24	1.26	20	29.98
December	78.6	84.4	72.7	87.4	68.	18.9	1.36	1.07	6	29.96
1916										
January	78.6	84.2	73.	88.9	69.8	**19.1**	0.42	0.42	1	29.94
February	79.5	85.8	73.	87.1	68.7	18.1	**0.20**	0.23	3	29.92
March	**80.1**	85.8	74.1	88.9	69.3	17.8	2.39	0.95	7	29.91
April	79.9	85.5	74.1	88.	69.1	17.1	5.46	3.45	10	29.91
May	79.3	85.3	73.4	88.5	**66.**	**20.**	11.25	2.49	20	29.94
June	77.5	82.2	72.7	86.	69.3	14.	**35.27**	5.02	**28**	29.95
July	**75.9**	**79.7**	72.	83.3	68.	**12.8**	**42.**	5.18	23	**30.01**

Observations were made at the station of the Deutsch-Südamerikanische Telegraphengesellschaft situated on the north side of Cape Mesurado, which juts out into the sea at an elevation of 230 feet. The station itself is about 230 feet above sea level and about 100 yards from the ocean. Thermometers, maximum and minimum of standard German make; raingage, similar to Glaisher's pattern. The thermometers were exposed on the second-story veranda of one of the cable buildings, landward side, 20 feet above the ground in open air with no shelter, but were never exposed to the direct rays of the sun. The raingage was placed similarly to that at Schiefflin except in the midst of more buildings.

TABLE III—SUMMARY OF CONTEMPORARY METEOROLOGICAL OBSERVATIONS AT MONROVIA AND SCHIEFFLIN, LIBERIA, JANUARY TO OCTOBER, 1915*

MONTHS 1915	TEMPERATURE (DEGREES F.)						PRECIPITATION		
	MEAN	MEAN MAX.	MEAN MIN.	ABSOL. MAX.	ABSOL. MIN.	MAX. DAILY RANGE	TOTAL INCHES	MAX. IN 24 HOURS	NO. DAYS MORE 0.01"
January	78.5	86.1	**70.8**	88.	**63.6**	**23.5**	**0.06**	0.06	**1.5**
February	79.8	86.5	73.2	89.4	70.8	16.9	0.23	0.10	3.
March	**81.1**	**88.7**	73.6	**91.4**	69.9	19.	4.61	1.32	8.5
April	**81.1**	88.4	73.9	91.	70.6	19.2	10.90	3.24	14.5
May	80.	86.4	73.6	89.3	70.9	17.	23.59	4.75	22.5
June	78.1	82.7	73.6	87.	70.6	14.1	**33.26**	**7.13**	**29.**
July	**76.3**	80.2	72.2	84.9	68.4	12.	29.76	5.95	25.
August	76.7	80.4	72.8	84.1	71.1	**11.1**	17.09	5.60	21.5
September	77.3	81.8	72.8	85.1	70.	12.6	30.35	5.59	29.
October	79.	85.4	73.3	87.1	68.6	18.	30.59	6.08	27.

* The January-October, 1915, monthly means shown in Table I, made near Schiefflin, are added to the monthly means for the same period shown in Table II, made at Monrovia, and their sums divided by 2, to obtain Table III.

and cloudy days as well as during sunshine. There are, of course, exceptions to this rule, as to all others. An individual here and there wears an ordinary felt hat apparently with impunity, but he is the *rara avis* of the tropics.

Effects of Elevation

Elevation above sea level markedly affects the temperature. In Freetown, Sierra Leone, 300 miles upcoast from Monrovia, the difference in mean monthly maximum temperature (1907-08) between an approximately

Table IV—Temperature Means, Monrovia and Schiefflin, Liberia, from three years' observations*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean	78.3	79.3	**80.4**	80.2	79.8	78.2	**76.4**	**76.4**	76.9	78.7	78.9	79.4	78.57
Mean maximum	85.9	86.6	**87.6**	87.3	87.1	83.5	81.	**80.8**	81.7	84.6	85.3	86.8	84.85
Mean minimum	**70.7**	72.1	73.2	73.2	72.5	73.	71.8	72.1	72.2	72.8	72.6	72.1	72.36
Mean daily range	**18.4**	16.6	16.9	16.5	15.	10.9	9.4	**9.**	10.	11.7	13.3	16.2	13 65
Monthly range	**25.**	21.	21.	20.	21.	18.	17.	**15.**	16.	18.	19.	24.	19.58

* Compiled: May, 1913, to Dec., 1914, from Table I; Jan., 1915, to Oct., 1915, from Table III; Nov., 1915, to Apr., 1916, from Table II.

The mean daily range is compiled from Table I only. The monthly range is the mean of the difference between the absolute maximum and absolute minimum.

Table V—Precipitation and Cloudiness Means, Monrovia and Schiefflin, Liberia*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Mean rainfall (inches)	**0.19**	0.76	2.76	8.37	17.74	**37.03**	24.57	20.54	26 89	28.87	9.29	2.51	179.5
Mean no. of days with more than .01"	**1.7**	2 3	7.2	12.8	20.8	**27.3**	25.7	22.2	**27.7**	**27.7**	19.3	6.	200.7
Mean no. of clear days	16.5	13.5	**18.**	16.5	7.3	2.	**1.3**	3.7	4 3	7.7	9.5	13.5	113.8
Mean no. of partly cloudy days	10.	9.	7.	11.5	17.7	11.3	5.3	9.7	12 3	15.7	15.5	13.	138.
Mean no. of cloudy days	4.5	5.5	6.	**2.**	6.	16.7	**24.3**	17.7	13 3	7.7	5.	4.5	113.2

* Sources as in Table IV. Cloudiness is compiled from Table I only. Clear day has less than one-third, partly cloudy from one-third to two-thirds, and cloudy more than two-thirds of sky obscured by clouds.

Table VI—Diminution of Precipitation during the "Middle-Dry" Season, Schiefflin, Liberia

Date		No. of days in period	No. of days of rain during period	Percentages of days of rain during period	Total rainfall	Mean daily rainfall
Begin	End				Inches	
1913						
July 1	July 24	24	22	92	30.02	1.25
July 25	**Aug. 14**	21	16	**76**	**4.3**	**0.2**
Aug. 15	Aug. 31	17	16	94	26.54	1.56
1914						
July 1	July 7	7	5	71	5.99	0.85
July 8	**Aug. 15**	39	24	**62**	**8.52**	**0.22**
Aug. 16	Aug. 31	16	15	94	13.20	0.82
1915						
July 1	Aug. 1	32	25	78	33.48	1.05
Aug. 2	**Aug. 26**	25	18	**72**	**6 40**	**0.25**
Aug. 27	Aug. 31	5	5	100	9.52	1.90

sea-level station and a hill station 880 feet above the sea was, at a minimum, 7.6° F. (August) and, at a maximum, 10.9° (April). In a section of the northwestern hinterland of Liberia, where, so far as we have been able to learn, no white men had ever before gone, the writer's aneroid registered

1,950 feet before an accident in the hands of an unsuspecting porter rendered it useless for the rest of the journey. At that elevation and at the height of the dry hot season, we traveled on foot day after day without undue loss of strength, the expedition ending its three-months' journey by a forced march of 225 miles through dense forest and over fearful paths

FIG. 1—The author, thermometer shelter, and raingage at the station of the Christian Woman's Board of Missions, Schieffiin, Liberia.

in nine successive days, an average of 25 miles a day. Such a record as that we have never been able to approach on the low-lying coastal plain, but we have experienced similar beneficial effects of altitude on physical endurance in the savanas of the Ubangi basin of Central Africa. The desirability of getting up above the sea is so immediately apparent that the first Europeans to settle the coast built their houses on the tops of hills, wherever such locations offered, and thereby dearly purchased the experience that later arrivals have had as a guide. For the hilltops, while

most agreeably cool, were too exposed to every wind that blew to be healthful; chills, fever, congestion, dysentery, death follow the winds to the tops of hills. Houses built later are perched on the sides of hills in some protected spot where the benefits of elevation may be had without its most conspicuously attendant evil. The desire to get up above things along the swampy West Coast is so strong that most Europeans prefer to climb stairs to living, dining, and sleeping rooms on the second and third floors rather than remain on the more easily attained first floor. This tendency of Europeans to live up off the ground disappears as one gets into the interior of the continent where the surface elevations above sea level are higher, and in Central Africa a house of more than a single story is exceptional.

The Winds as a Factor in Habitability

The factor that makes the coast as good as it is for white men is the winds. Day after day the sea breeze blows, and night after night the land breeze goes back out to sea. Morning comes, and the shift again is made; while during the lull that intervenes around 8 or 9 o'clock each morning, as the land breeze trades itself for the wind from the sea, one has a taste of what life might be there without the winds. Fortunately periods of complete calm are rare, and one has only discreetly to place oneself in the breeze to be cool. During the northern summer, when an area of low pressure obtains over the Sahara, the dominant wind of the West Coast is the moisture-laden southwest monsoon. The winter months are characterized by the *harmattan*, blowing intermittently from the northeast. Knox writes of this wind:[7]

> The Harmattan is experienced as a wind which blows, especially in the months of December, January, and February, from the N.E. and is a hot wind in some localities and a cold wind in others, according to circumstances. During this season, in the actual coast districts, it alternates with the land breezes, which blow from midnight till about sunrise, chiefly from the N.W. As a general rule the Harmattan begins early in the morning and falls off towards midday. Dried by its passage over the warm sands of the Sahara, it brings sandstorms in its course. Under its influence the lagoons of the coast region rapidly give up their water, while stagnant waters disappear altogether, as, except perhaps for an occasional storm, it does not rain during the Harmattan period. Further, in the process of this evaporation, it gives up a large amount of heat and is thus rendered a comparatively cool wind. The Harmattan generally gives place to sea breezes from the S.W., while land and sea breezes alternate during the remainder of the year.

One may say that the nights are always cool. No sooner has the sun dropped to within an hour or so of the western horizon than every living thing seems to find at least some small relief from the severe conditions of the preceding ten hours. The birds, silent since 10 or 11 o'clock in the morning, begin to sing; the wild life of the forest bestirs itself, and feeding and drinking begin again around the common water holes; the native

[7] *Ibid.*, pp. 92-93. The character of the *harmattan* in the hinterland of the Guinea coast is discussed by H. W. Braby, *Quart. Journ. Royal Meteorol. Soc.*, Vol. 39, 1913, pp. 301-306.

appears more numerously in the open spaces of the towns and *fakais*, and preparations are made for the one ceremonial meal of the day, which is eaten in the evening, and for the strenuous activity of the play or the dance that may quite likely follow when darkness falls. The European, wise in following the example of native life about him, closes his factory or leaves his mission work or government office and goes out for a stroll or a horseback ride or a game of tennis. Evening is the social time *par excellence* of the tropics. The cool nights are second in importance to the winds in making the African West Coast habitable for Europeans. Sleep and rest, as far as nocturnal climatic conditions can control them, may be had perfectly. The writer does not recall a night spent in Liberia under less than one blanket, while frequently two or three were needed. The early morning, before 6.30, is mildly fresh but not enough so to invigorate one perceptibly. Between 7 and 9 A. M. there is likely to be a "muggy" period of calm, oftentimes the most unpleasant part of the day, while the land breeze is dying away and the sea breeze is getting its daily start. From 11 to 2 o'clock is the time one may expect to "have a head" if a "touch of sun" has previously been experienced, for during that period the total effect of the sun is so great as to make itself unpleasantly felt even in the best-constructed houses the writer has seen. It is during a part of this period that the siesta is taken. At 4.30 or 5 the evening's coolness has come again, and one is passively content in the thought of having lived through another day.

A Region of High Humidity

Humidity data for Liberia are not available, but for Freetown (Sierra Leone) the mean annual relative humidity is 79.4 per cent, the highest being 84.6 per cent in September and the lowest 74.2 per cent in March. For Grand Bassam, on the Ivory Coast, about 500 miles downcoast from Monrovia, the mean relative humidity for the year (1904 and 1905) is 87 per cent, the highest being 90.1 per cent in June, July, August, and September and the lowest 83 per cent in January. Somewhere between conditions in Sierra Leone and those in Grand Bassam may be found the humidity of Liberia. One may safely say that it is very high; certainly as great as in Sierra Leone but probably not so extraordinarily high as in Grand Bassam.

During the dry season the rainfall is negligible; but moisture is supplied to the plant life by the excessive dews that in many cases are equivalent to light showers. The very heaviest dews come during the early part of the dry season, but they are never absent. Frequently, under the eaves of the corrugated iron roofs of our station buildings, there would be in the morning lines of heavily splashed sand where the dew had poured off the roofs in the night. Every leaf and blade of grass in sight would sparkle in the morning sun while it drooped under the weight of the dew

it bore. A native custom not without its amusing side is that of sending a little naked boy ahead through the path which his elders must travel early in the morning, that his body may shake as much dew as possible off the grass and brush which closely borders every path and enable those who follow to pass through dry-shod, as it were. A distinct fall in temperature is not necessary to produce dew. The air is so nearly saturated with moisture that the slightest drop of the thermometer precipitates an appreciable amount. It is only by the moisture thus received that plant life is enabled to remain as green as it does during the blistering heat of the dry season.

The Rainy Season

The storms that usher in the rains come suddenly and usually from the southwest. They terminate as suddenly as they begin. Within an hour a terrific blow and a sharp downpour may have been conjured up out of nothing in the southwest and have passed out of sight to the north or northeast. The first storms of a new rainy season occur usually at night, getting gradually later in their appearance until they have introduced the real daytime rains of the season. Then storms practically cease, and the serious business of pouring water on the earth begins. There is little of the spectacular or boisterous about the rainy season proper; there is a common absence of wind, of thunder, of lightning, of pyrotechnics of all sorts; the rain simply falls—falls steadily and rather quietly for days and weeks and months, and then, in a burst of curt, furious storms, as at its beginning, it stops, and the sun and wind begin their task of lapping up this torrential fall of useless water.

The season of rains is probably the most pleasant one for Europeans. There are a few days during that season when the feeling is one of "stickiness" and great oppression, but such days are not common. The daily temperature range is from 3° to 10° F. A fire in an open grate, if a grate has been built into a house, as is infrequently the case, is a rather happy thing; its genial effect is more in drying out the house than in directly furnishing warmth. The natives are often sufferers from cold on rainy days and sit around the little fires that are kept eternally going within their mud-walled houses. When they find it necessary to travel or work out of doors in an actual rainfall, it is a common practice for them to remove even the scanty cloth they at other times wear, to prevent the chilling of their bodies that would come from the evaporation by the wind of the cloth's moisture as they move about. They think it a strange thing that a white man, instead of reducing the amount of his clothing under those circumstances, should augment it by the addition of a raincoat and a waterproof helmet cover and maybe gloves and gum boots.

During the midst of the rains there is no stagnant water, and mosquitoes are scarce. The weeks at the beginning and particularly at the end of the rainy season are the most unhealthful. At the latter time the earth is

filled to overflowing with water, and, as the higher areas dry out, the water, caught in pockets and depressions, big and little, and protected by dense foliage above, furnishes the very best sort of birthplace for the germs and the animal life that acts as hosts and transmitters of these germs, and they soon are seriously attacking the human inhabitants of the region.

Influence of the Rains on Human Life

The rains have an important influence on the life of the country in relation to travel, transportation, communication, and food supply. The

Fig. 2—Native architecture, adapted to the heavy rainfall. The thick thatch roof is brought practically to the ground as a protection to the mud walls.

wet season largely determines the time for traveling and the means of locomotion. Natives having visits to pay to distant parts plan to go during the dry season. White officials or traders try to make the necessary tours of their posts during these months. Missionaries know it is best to plan their work so that the special activities of the base station may be developed during the rains, leaving the rest of the year for extensive itineration. It is not always possible to do these things, but the rains cause one to try. Toward the end of the wet season, also, many small rivers are made navigable, and the navigable stretches of the larger waterways are increased, so that, for some time after the rains have ceased, water communication is still possible with points that later in the dry season can only be reached overland and by a much greater expenditure of effort, time, and

money. When water communication is cut off, transportation to such points is usually on the heads of native porters. This is expensive. On the basis that an average porter carries 60 pounds 15 miles a day for 25 cents, the ton-mile cost of this means of transportation is over 55 cents—a charge that ordinarily prohibits transportation from a locality very far distant from a waterway.

An interesting illustration of the effect of the rainy season on food supply is a custom in vogue before imported salt was available. During

FIG. 3—Americo-Liberian architecture. Executive Mansion and home of the President of the Republic of Liberia at Monrovia.

the dry season each large town in the Liberian hinterland used to send a delegation down to the coast, 250 miles away, to "cook salt," as they phrased it, from the sea water in sufficient quantities to last the town until the succeeding dry season.

The rains fill swamps, flood paths, wash away bridges, bring rivers out of their banks, sometimes in twelve hours or less, and in general upset the scheme of life worked out for the dry season. The rains have a direct effect on the style of native architecture. The houses, being of mud, are necessarily low and squat and of cramped dimensions so that a thick thatch roof of but medium size and within the power of one man, or of two or three, to make and to renew, will adequately cover it almost down to the ground all around and thus protect the mud walls from the soaking

and disintegrating rains. Only the chiefs can afford the labor necessary to thatch and re-thatch, every second or third year, a really roomy house.

European Life on the West Coast

We may turn now to some considerations especially touching the life of Europeans in Liberia and, by extension, along the West Coast in general. Houses for white men are commonly elevated on pillars two to six feet above the ground. The upper stories are used as the living quarters. The

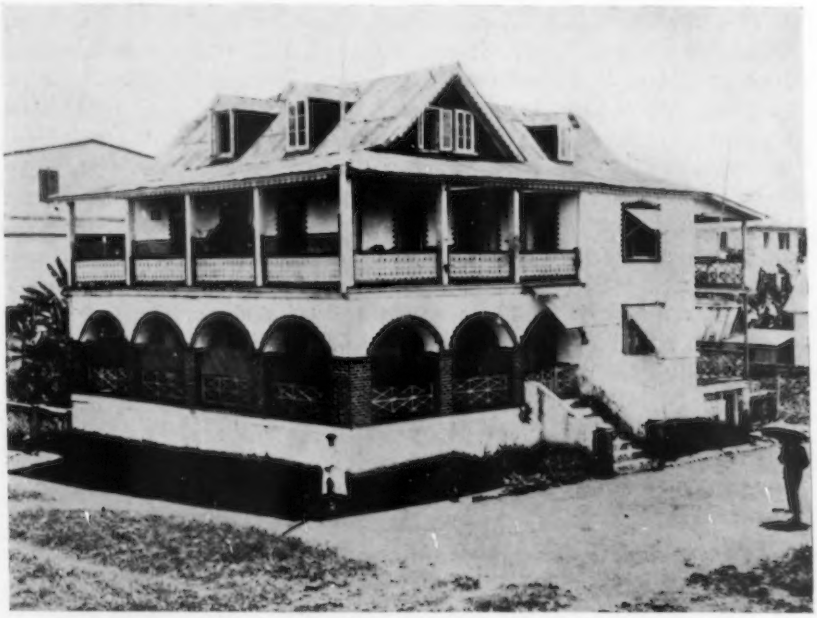

Fig. 4—Americo-Liberian architecture. United States Legation, Monrovia, Liberia.

material of which buildings are constructed is usually corrugated galvanized iron, although concrete, stone, and brick are growing in favor and will continue to do so. Wood is scarcely ever used except for the necessary framing, both because prepared timbers and planks are expensive and difficult to get and because the most kinds of wood are little else than food for the misnamed ravager known as the white ant—in truth neither white nor ant. Railroads and telegraph and telephone lines were at first very hard to maintain because of these same termites, which have long since forced the use of steel for ties and poles along the right of way.

Climatic conditions largely determine the foods the European shall eat, both imported and local. The latter are limited to what the native knows how to raise for himself or what the European has the time and knowledge to attempt to raise, and in both cases the climate has set a limit. This

limit permits the raising of some few sorts of foods to which the European has become accustomed in his home country but prohibits the raising of a good half or more of such foods. Rice, bananas, plantains, palm oil, sugar cane, manioc, breadfruit, coffee, coconuts, nubbins of corn, and greens of various sorts about make up the native vegetable diet. The European or Americo-Liberian may add beans, carrots, watermelons, turnips, better corn, more kinds of greens, and maybe a few other articles if he has luck. But the staples which form his diet at home must be imported—potatoes, sugar, flour, oats, milk, butter, salt, cheese, tart fruits; and all those except potatoes must be put up in tins carefully and with special reference to hot and humid conditions. Sugar, flour, salt, etc., were tinned in normal times by a large New York wholesale grocery house at the rate of 4 cents a pound. A barrel of flour costing $7 originally would be worth $15 when put up in the usual seven-pound tins, before it even started on the long trip to its destination, expensive enough even before the war. In 1918 a grocery consignment invoiced at $700 by a Chicago mail order house cost the consignee, laid down at his West African coast port, in charges for rail and ocean freight and marine and war-risk insurance, an additional $750, making a total of $1,450 for the order—and it had still to be transported by rail and river 900 more miles to his interior station and to pay in addition an ad valorem customs duty of 12½ per cent. The expense and difficulty of securing imported foodstuffs, even in times of peace, and the lessened nourishment contained in preserved tinned goods, make the climatic control of local crops a very real thing to the white man. He is often compelled to rely so absolutely on tinned food that one of the native pidgin-English equivalents for the phrase "to prepare a meal" is "to kill a tin"!

Tropical Hygiene

Personal hygiene in the tropics is a rather different and more painstaking matter than in the native home of the white man. In the humid tropics the white man cannot do sustained manual labor. Knowledge of that fact has attained the standing of a maxim on the West Coast, and if any further proof were needed it would be furnished by the evident inefficiency of the brave and willing European and South African troops of the line in the various tropical African campaigns of the war, as compared with the unremitting service rendered by the native soldiers drawn from Senegal, Nigeria, the Belgian Congo, and East Africa. Houses for white men have to be well screened with fine-mesh wire, and an equally fine-mesh mosquito tent covers every bed. Woolen blankets and light woolen underwear for those whose skin is not thereby irritated are proper things to have. To eat oftener and less heartily than in the homeland, is probably a good rule. Exercise is absolutely necessary, no matter how contrary it may be to one's inclination. All men qualified to discuss the

matter agree that even moderate alcoholic indulgence is a wholly bad thing in the tropics. The red blood corpuscles are measurably thinned out, partly by the decreased supply of oxygen that the respiratory system gets; and this anaemic tendency is aggravated by malaria and by quinine—both by the disease and its specific, since malaria and quinine each tend to destroy the red cells.

Malaria and dysentery are endemic; yellow fever, plague, cholera, and smallpox have not occurred in Liberia for years. Sleeping sickness and the species of tsetse fly that is believed to carry this disease are both present in the republic, the fly in great quantities along its usual haunts, the river banks; but of sleeping sickness itself there have been only half-a-dozen instances in as many years. Europeans are rarely affected by the trypanosome in any case. Haematuric, or black-water, fever, following long-continued attacks of malaria, is probably the most dreaded of West Coast ills. Quinine has attained almost to the rank of a food on the West Coast; practically every European dining table has its bottle of the drug, and guests are offered one of the bitter tablets as a matter of course. Ordinarily a white man takes five grains a day as a prophylactic measure. In case of actual fever the dose is increased. The writer administered as much as 46 grains in 20 hours to a fever victim, but that was probably an excessive dose.

Dysentery must always be guarded against; a condition of perspiration, followed by injudicious cooling in a breeze and a consequent chilling of the abdomen, are the external circumstances that especially favor dysentery. Some Europeans, for the protection of the abdomen from chills, are compelled to wear a cummerbund—several feet of wide woolen belting wound around the body. The few European children on the coast appear to do fairly well for the short time they are there, but one may be sure that every season a child spends on the West Coast will be at the later cost of vitality that may handicap him for life. The various sorts of intestinal worms affect children greatly. European women do not withstand coast conditions as well as do men. Their more sensitive nervous system is particularly likely to be affected.

The Nervous Strain of the Tropics

This matter of nervous and mental make-up brings us to the final consideration of this paper. Along with the trying conditions of climate and disease go a host of pests and constant recurrences of life's little irritations. Moths eat up clothing; cockroaches devour bookbindings and nest in the cookhouse; rats climb to impossible locations and leave nothing but the fragments of what they have eaten there; white ants consume the sills of houses and the rungs of chairs; driver ants sweep through the house, and every other living creature therein must vacate, from the lord and master down to the lurking lizard, even if it be in the dead of night or the midst

of rain; jiggers bore in under the skin of the foot and lay their eggs; fleas bite; the heat produces rash against which the lightest clothing feels like nettles; dhobie's itch makes its appearance and acts as if it had taken up its permanent residence. These things and the proverbial one thousand and one others like them are real and irritating at any time, but through the blur of a "touch of sun" or the haze of a burning fever they assume proportions out of all reason. The odors, the mists, the sights, the sounds get on the nerves; the heavy, drooping, silent, impenetrable green forest everywhere shuts one in like a smothering grave; the mind grows sick, and the body follows. For these reasons, largely mental, no one should stay on the West Coast longer than eighteen months at a time.

The writer has cited many things in this paper that do not bear directly on climate, in an attempt to point out a few of the influences that, connected with an unusual and inhospitable climate, combine to make acclimatization at present all but impossible. His feeling is that, if the earth's increasing population makes the acquisition of additional cultivated land areas of sufficient importance to justify the immense efforts that would be necessary for the sanitation of tropical countries, acclimatization of the white man to those countries would be possible. This means, of course, that the present bar to such acclimatization is mainly disease rather than climate. At present the relation of whites to the African West Coast can only be one of tolerance.

THE UNEXPLORED MOUNTAINS OF NORTH AMERICA

By ALLEN H. BENT
Appalachian Mountain Club

American mountaineering has had an interesting past and promises to have a brilliant future. Rock climbs, snow peaks, volcanoes, mountains rising from the ocean and from the desert—they are all here, like the bright seraphim in endless row.

The Torngats of Labrador

While most of the high mountains of North America are in the West there is one wild group in the East, the Torngat Range, in northern Labrador, which has the distinction of being one of the oldest mountain chains in America. The Eskimo word *torngat*, meaning "bad spirits", is justified. "A single view of the bare, forbidding, riven, and jagged cliffs of the sawtooth ridges and alpine horns, whether seen in the interior or springing their thousands of feet from salt water in the fjords, leaves no wonder at the name," says Grenfell.[1] The highest part of the range, rising directly from the sea in latitude 59° N., is believed to be over 7,000 feet. Professor A. P. Coleman, former president of the Alpine Club of Canada, has done a little pioneer climbing there, attaining summits of over 5,000 feet,[2] but the range is practically unknown to mountaineers. There are many small living glaciers at the cirque heads of the highest valleys.

High Peaks in the Western United States

Probably most of the mountains over 10,000 feet in the United States—and they are numerous—have been climbed at least once, though many are far from accessible. The surveyors of the U. S. Geological Survey go almost everywhere, without making much ado about it, either. Mining prospectors are another hardy race that engage largely in mountain exploration, though for obvious reasons they do not often leave any printed record of their work.

The culminating heights of California, Oregon, Washington, Colorado, Arizona, and perhaps Idaho and New Mexico, are climbed every summer. There is, for instance, a saddle trail from Flagstaff nearly to the top of San Francisco Peak, the highest in Arizona. But the highest peaks of Montana, Wyoming, Utah, and Nevada, the first nearly 13,000 feet, the others more than that, are hardly known by name outside their respective states.

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[1] W. T. Grenfell and others: Labrador: The Country and the People. New York, 1913, p. 100.

[2] A. P. Coleman: Mt. Tetragona. *Canadian Alpine Journ.*, Vol. 7, 1916, pp. 5-11; *id.*: Two Climbs in the Torngats, *ibid.*, Vol. 8, 1917, pp. 34-42. Cf. *Geogr. Rev.*, Vol. 4, 1917, p. 58.

Montana's highest mountain, Granite Peak (12,847 feet), in the southern part of the state northeast of the Yellowstone National Park, is in a region that has not yet been mapped, though preliminary surveys have been made. The nearest stations would seem to be Columbus or Big Timber on the main line of the Northern Pacific Railway. Northwest of the latter place is an isolated group of saw-toothed peaks, bearing the singular name of the Crazy Mountains.[3] Rising 7,000 feet above the railway (11,000 feet above sea level) they form a striking picture seen from the plains.

Speaking of strange names recalls the manner in which the Siskiyou Mountains in northern California and southern Oregon received their baptism. Some French-Canadian trappers from the Hudson's Bay Company post on the Columbia River had strayed down within sight of the northern end of this range. Their ford over the river they named "Six Cailloux" (six stones) and from that the settlers named the mountains, making a name that looks as though it were of Indian origin. "Wasatch" (Osage) and "Ozark" (Aux Ares) are similar cases of perverted French names.

Gannett Peak (13,785 feet), in the Wind River Range, is the highest summit in Wyoming. It is not a difficult peak but is rather a long way from railroads—Lander, at the end of the Lander branch of the Chicago and Northwestern Railway, being the nearest point.

Hyndman Peak (12,078 feet), the highest in Idaho, is in the Sawtooth National Forest about twenty miles northeast of Hailey Hot Springs, which is on the Wood River branch of the Oregon Short Line Railroad. The next peak to the northwest bears the name of the Devil's Bedstead. These are in a mining and sheep-grazing region. Fifty to a hundred miles farther north are the Salmon River Mountains, with big game, far from all railroads.

The Wasatch and Uintah Ranges

Although Utah has been more thoroughly mapped by the U. S. Geological Survey than any other of the far western states, most of its mountains, except those of the Wasatch Range, which culminates at 11,900 feet, are inaccessible and seldom climbed. The Uintah Range in the northeastern part of the state, remarkable for running east and west, has the highest peaks—King's Peak (13,498 feet), Emmons Peak (13,428 feet), and Gilbert Peak (13,422 feet). All three of the men, Clarence King, Samuel F. Emmons, and G. K. Gilbert, whose names are thus perpetuated, were prominent in the early government surveying expeditions. Several towns, Roosevelt among others, have sprung up in recent years in the Uintah basin south of the range, and from some one of these, perhaps Vernal, where the supervisor of the Ashley National Forest has his head-

[3] M. R. Campbell and others: Guidebook of the Western United States. Part A. The Northern Pacific Route, *U. S. Geol. Survey Bull. 611*, Washington, D. C., 1915: reference on p. 86.

quarters, it would be necessary to outfit with pack train. The forest supervisor of the region is generally the best man from whom to obtain information of this sort. Roosevelt and Vernal are reached by automobile stage from Helper on the main line of the Denver and Rio Grande Railroad, or from Mack on a branch of the same road. From the north the range can be reached from Carter in southern Wyoming on the Union Pacific Railroad. It is evidently an interesting range, for F. V. Hayden, chief of the Geological Survey many years ago, wrote most enthusiastically about it: "In the artistic sense no range that I have seen on this continent can compare with it in beauty."

Mountains of the Desert Region

The La Sal Mountains near the Colorado boundary also reach elevations of 13,000 feet. The other mountains of Utah, those of Nevada and Arizona, as well as those in the southern and western part of New Mexico and in southern California, rise from the desert. They do not attract many climbers, though John Muir, who seems to have gone almost everywhere, had a good time climbing in Nevada.

In southern Utah the Abajo and Henry Mountains both have peaks over 11,000 feet, and near the Arizona border is the lonely and fascinating Navajo Peak (10,416 feet), four miles from which, in one of the most inaccessible parts of the United States, two hundred miles from a railroad, was discovered in 1909 the great Rainbow Natural Bridge.

Wheeler Peak (13,058 feet) was long supposed to be the highest in Nevada. It is in the Snake Range in the eastern part of the state—a part that has not yet been mapped. It commemorates Major George M. Wheeler, who, as a member of the Corps of Engineers of the United States Army, was engaged in surveying in the state from 1871 to 1879.

There are many peaks over 10,000 feet scattered over the state, all rising from the desert. Recently Boundary Peak, in the northern part of the White Mountains close to the California line, has been found to be slightly higher (13,145 feet) than Wheeler Peak. These are the highest of the desert mountains.

Mountains of Nevada and Eastern California

The East Humboldt, or Ruby, Range, perhaps the most rugged mountain mass in Nevada, is seen from the trains of the Overland Route beyond the town of Wells, sixty or seventy miles west of the Utah line.[4] A number of the peaks are from 11,000 to 12,000 feet, the railroad here being just about a mile above sea level. The crest of the range is included in the Humboldt National Forest.

The greater part of the White Mountains just referred to lies in Inyo County, California. The range, in which some mining has been done, is

[4] W. T. Lee and others: Guidebook of the Western United States, Part B, The Overland Route, *U. S. Geol. Survey Bull. 612*, Washington, D. C., 1915; reference on p. 163.

included in the Inyo National Forest. It is seen from the eastern heights of the Yosemite National Park. The Keeler branch of the Southern Pacific Railroad runs through Owens Valley, which separates this range from the Sierra Nevada, and a toll road to Deep Spring Lake crosses the southern end of the range at a height of over 7,000 feet. The Inyo Mountains, also over 11,000 feet, continue the range to the south to Owens Lake, an alkaline lake 3,569 feet above the sea.

The Panamint Mountains, another range in eastern California, southeast of the White Mountains, rise west and south above Death Valley, the lowest point of which is 280 feet below sea level, the lowest part of the United States. Telescope Peak (11,045 feet), its highest point, is about seventy-five miles from Mt. Whitney, the highest mountain in the United States, and a little south of east from it.

Mountains of Arizona and New Mexico

The White Mountains of Arizona, mainly in the Apache Indian Reservation, many miles from railroads, contain, according to Dillon Wallace, the largest primeval forest in the United States. They are reached by a daily stage from Holbrook to Fort Apache near the center of the reservation. This reservation, of some five thousand Indians, is 95 miles north and south and 70 miles east and west. Holbrook and Fort Apache are about 5,000 feet above sea level, and the highest point of the range, Thomas Peak, is 11,496 feet. Mr. Wallace, who made a circuit of this peak, says its scenery is "unsurpassed for variety and tone,"[5] to say nothing of its being a sportsman's Eden. An Apache superstition prevents the Indians from catching trout or shooting wild turkey. Deer, bears, mountain lions, and wildcats are numerous, and there are still mountain sheep.

There is a Sierra Blanca (White Mountain) in New Mexico, which state has also a Black Range with at least two peaks over 10,000 feet. One of these, Yellowjacket Peak, carries the color scheme a little further, though it was probably named after an exciting combat with a familiar winged insect—a combat in which firearms were useless.

Peaks of the Sierra Nevada

In 1907, when Joseph N. Le Conte wrote "The High Sierra of California," the first of the American Alpine Club's publications—a monograph that every lover of these mountains ought to possess—he reminded us that there were still virgin peaks in the Sierra Nevada. A year or two afterward Professor Le Conte and his friend, James S. Hutchinson, made the first ascent of one of these, Mt. Abbott (13,700 feet), after finding it inaccessible from two sides; but, so far as the writer knows, only one of the Evolution Group, a fine group 13,000 feet high, has ever been ascended. The same is true of the Palisade Group, which

[5] Dillon Wallace: Saddle and Camp in the Rockies. New York, 1911, p. 42.

is still higher (13,700 to 14,200 feet), and of the Kaweah Peaks. The North Palisade and Humphreys Peaks (each over 14,000 feet) have been ascended but once, by Le Conte and Hutchinson. "The Palisades," says Professor Le Conte, "furnish the very finest field in the Sierra for the mountain climber. . . . The eastern side is a sheer drop of several thousand feet, and at the base of the cliff are several residual glaciers."[6]

The Canadian Rockies

Mountaineers have been busy making first ascents in the Canadian Rockies since the opening of the first transcontinental railroad across Canada and have already climbed the peaks nearest the two newer railroads in the region farther north; but the range is fifteen hundred miles long, and there is plenty of new work for the climber with a pack train.[7] What is probably the next to the highest of the Canadian Rockies, Mt. Sir Alexander (12,500 feet), was not attempted, approached, or even named until 1914, although Mr. R. W. Jones, when surveying for possible passes for the Grand Trunk Pacific Railway, had seen it ten years before; but he was looking for low passes, not high mountains, and so said nothing about it. Mr. S. Prescott Fay, of Boston, had seen it from a distance in 1912 and was the first to map and photograph it two years later. The same summer that Mr. Fay and his friend, Charles R. Cross, Jr., were exploring this big mountain, Miss Mary L. Jobe, of New York, made an attempt to climb it with Donald Phillips.[8] Mr. Fay found another fine peak, Mt. Ida, still farther north.

The main chain of the Rockies in the southern part of Canada averages sixty miles in breadth, running from southeast to northwest. On the southwest side is a long, deep trough occupied successively by the Kootenay, the Columbia, the Canoe, the Fraser, the Parsnip, and the Finlay Rivers of the Peace River system, and the Kachika of the Liard River system. To the west of this are more mountains, older than and different from the Rockies.

Near the United States are the Purcell and Selkirk Ranges, the latter conceded to be one of the most interesting ranges in the world. It is some four hundred miles long and, while three fine mountaineering books—W. S. Green's "Among the Selkirk Glaciers" (1890), A. O. Wheeler's "The Selkirk Range" (1905), and Howard Palmer's "Mountaineering and Exploration in the Selkirks" (1914)—are devoted exclusively to it, it still has many peaks awaiting the conqueror.

[6] J. N. Le Conte: The High Sierra of California (Alpina Americana No. 1), American Alpine Club, Philadelphia, 1907, p. 10.

[7] C. E. Fay: Recent Mountaineering in the Canadian Alps, *Geogr. Rev.*, Vol. 2, 1916, pp. 1-18.

[8] See S. P. Fay: The Canadian Rockies Between the Yellowhead Pass and the Peace River, *Appalachia*, Vol. 13, 1913-15, pp. 238-257; Mary L. Jobe: Mt. Kitchi: A New Peak in the Canadian Rockies, *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 481-497, with colored map, 1:300,000. For a fine picture of Mt. Sir Alexander see Mary L. Jobe: A Winter Journey Through the Canadian Rockies, from Mt. Robson to Mt. Sir Alexander, *Appalachia*, Vol. 14, 1916-19, pp. 223-233.

The highest peak, Mt. Sir Sandford (11,590 feet), has been climbed only once, by Mr. Palmer and his friend, E. W. D. Holway, with two Swiss guides in June, 1912.

The Cariboo Range

Still farther west is the lower Gold Range, or Columbia Range, as it has been called in recent years. This is not important; but its northern continuation, the Cariboo Range, is one of the most interesting fields for the mountaineer. The surveyors for the first Canadian transcontinental railway explored most of its passes, but their work was soon forgotten, and it was not until 1916 that Professor Holway and Doctor Gilmour made a beginning with ice axe and rope.

In his account of "The Canadian Rockies North of Mt. Robson" J. Norman Collie says of the Cariboo Range: "My first view of them from a peak we climbed in 1910 in the Moose Valley astonished me. Mumm had seen them in 1909 . . . . . They are bigger and finer than the Selkirk Range as seen from the Rocky Mountains near Laggan. Two peaks that I have seen many times are especially fine, one a snow peak, and the other much sharper and with a good deal of rock on it. There is also a great glacier coming from the middle of the range eastwards. In shape these Cariboo Mountains are more rugged, wild, and beautiful than those in the Rockies. This one would expect, for they are made of the harder crystalline rocks and not of limestone . . . . the Cariboo Mountains are no minor group, but will yield to their explorers some of the finest peaks, some of the grandest scenery, and some of the most interesting geological information to be obtained in Western Canada."[9]

The Coast Range of British Columbia

West of the Gold and Cariboo Ranges is the Coast Range of British Columbia, continuing up into the Yukon Territory and the panhandle of Alaska. It is nearly a thousand miles long altogether. The mountains, although not many of them are over 9,000 feet, rise from sea level, are in a region of much precipitation, and have many fine glaciers, some of them coming down to the sea. It is a magnificent chain, as everyone who has threaded the inland channel from Vancouver to Skagway knows, a region of beautiful fiords and scenic wonders.

The range averages a hundred miles in width, dropping off on the east to an uneven plateau, about 3,500 feet above the sea. It is practically untouched by mountaineers. The British Columbia Mountaineering Club of the city of Vancouver is doing good work in exploring the southern end and has opened up some wonderful scenes. John Muir's book, "Travels in Alaska," has a glowing account of an ascent he made in 1879 from

[9] J. N. Collie: The Canadian Rockies North of Mt. Robson. *Appalachia*, Vol. 12, 1909-12, pp. 339-349; reference on p. 346.

Glenora on the Stikine River (spelled "Stickeen" by Muir), in British Columbia, about one hundred miles north of Wrangell. Glenora Peak he estimated to be about 7,000 feet in altitude, and of the view he says: "I never before had seen so richly sculptured a range or so many awe-inspiring inaccessible mountains crowded together" . . . "more than three hundred miles of closely packed peaks of the great Coast Range . . . their naked tops and dividing ridges dark in color, their sides and canyons, gorges, and valleys loaded with glaciers and snow. From this standpoint I counted upwards of two hundred glaciers . . . Alps rise beyond alps as far as the eye can reach . . . Everywhere the peaks seem comparatively slender and closely packed, as if Nature had here been trying to see how many noble, well-dressed mountains could be crowded into one grand range."[10]

The highest mountains of Vancouver Island, over 7,000 feet, in a region of beautiful lakes, have been set aside in recent years by the government as Strathcona Park. The chain of which these are a part extends through practically the whole of the island, which is 290 miles long. It is a submerged range entirely surrounded by deep water, but even so it makes a magnificent showing.[11]

Mt. Logan

The highest mountain in Canada is not in the Rockies but in Yukon Territory near Alaska. It was discovered in 1890 by Israel C. Russell in his first attempt on Mt. St. Elias. He says: "The clouds' parting toward the northeast revealed several giant peaks not before seen, some of which seem to rival in height St. Elias itself. One stranger, rising in three white domes far above the clouds, was especially magnificent. As this was probably the first time its summit was ever seen, we took the liberty of giving it a name. It will appear on our maps as 'Mt. Logan,' in honor of Sir William E. Logan, founder and long director of the Geological Survey of Canada."[12] The height he estimated at 19,500 feet, and now, thirty years later, it is still unclimbed.

The Rocky Mountains near the Arctic Circle

Elihu Stewart, formerly Superintendent of Forestry for Canada, in his book "Down the Mackenzie and Up the Yukon in 1906," tells of going from Fort McPherson (the most northern of the Hudson's Bay Company's posts, near the delta of the Mackenzie in latitude 67°) down Stony Creek (La Pierre) to the Rocky Mountains, which he crossed some 60 miles north of the Arctic Circle at a height of 2,600 feet, the mountains rising 2,000 to 3,000 feet higher still. Of the journey down the Pacific side in late July he wrote: "We passed over some snow on the hillsides, but with-

[10] John Muir: Travels in Alaska, Boston and New York, 1915, pp. 93-94.

[11] A number of articles on Strathcona Park are to be found in the *Canadian Alpine Journal*, Vol. 5, 1913.

[12] I. C. Russell: An Expedition to Mt. St. Elias, Alaska, *Natl. Geogr. Mag.*, Vol. 3, 1891, pp. 53-200; reference on p. 141.

cut the least difficulty, as it was almost as hard as ice . . . . The mountain scenery here was very beautiful, though the peaks are not so high as further south . . . . No large glaciers are to be seen in this region, but considerable snow remains the year round on some of the peaks."[13] He was five days in covering the eighty miles from Fort McPherson to Bell River, a tributary of the Porcupine which flows into the Yukon at Fort Yukon.

The Alaskan Rockies

When the Rocky Mountains and the Coast Range, after their journey of hundreds of miles in a northwesterly direction, reach the international boundary they turn to the west and later to the southwest across Alaska in two crescents, from two hundred to three hundred miles apart, the great mesa-like plain of the Yukon River and its tributaries separating the two systems which have marched along so majestically together from the southland.

Of the extreme north Vilhjálmur Stefánsson, in "My Life With the Eskimo," says: "The low, coastal plain of northern Alaska is triangular in shape, with its apex at Point Barrow, perhaps two hundred miles north from the base, which is formed by the east and west running Alaskan spur of the Rocky Mountains, which comes within a few miles of the coast in eastern Alaska at the international boundary and meets the ocean in western Alaska at Cape Lisburne. . . . Their distance from the sea is not more than six or eight miles at Demarcation Point, while their highest places are probably about 10,000 feet in elevation and lie southward from Flaxman and Barter Islands, where they contain a few small glaciers."[14]

The Arctic Range is sometimes called the British Mountains. Thomas Riggs, Jr., engineer to the Alaska Boundary Commission, thinks the higher summits are only about 7,000 feet high and says they are bare of snow in summer, as well as barren of timber.[15] This continuation of the Rocky Mountains in Alaska has various names, "Endicott" being applied to the central part of it and "Baird," "Waring," and "DeLong" farther west. The Davidson Range (south of the Arctic Range), discovered in the winter of 1890 by J. H. Turner, of the Coast and Geodetic Survey, while surveying the international boundary, was named after George Davidson (1825-1911), the first United States government surveyor to explore the Alaska mountains (1867). The mountains of this range reach a height of 5,000 to 6,000 feet and extend many miles both east and west of the boundary. They are densely wooded with pine trees, some of which attain a height of forty to fifty feet. The journey of the explorers from their camp, about one hundred and twenty-five miles north to the Arctic Ocean, was made in March, the thermometer sometimes reaching 50° below zero.[16]

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[13] Elihu Stewart: Down the Mackenzie and Up the Yukon in 1906. London and New York, 1913. p. 124.
[14] Vilhjálmur Stefánsson: My Life with the Eskimo. New York, 1913, pp. 65, 66.
[15] Thomas Riggs, Jr.: Surveying the 141st Meridian. *Natl. Geogr. Mag.*, Vol. 23, 1908, pp. 685-713.
[16] John Bonner: Alaskan Exploration in 1891. *Californian Illust. Mag.*, Vol. 1, 1892, pp. 243-254.

Mt. McKinley and Mt. Foraker

Alaska has the highest mountain on the continent—Mt. McKinley, Tennali, or Denali, as you prefer (20,300 feet or 20,700 feet)—the tallest snow mountain in the world, for the perpetual snow line here is not far from 2,000 feet above sea level. Since 1903, when first attempted, it has been the scene of considerable activity, and four books have been devoted entirely to it. The near-by Mt. Foraker, or Denali's Wife, rising 17,000 feet above the sea, still stands an "imperial votaress . . . in maiden meditation, fancy-free."

The view of these two great mountains, seen from Lake Minchumina only 1,500 feet above sea level, is stupendous in its majesty, says Archdeacon Stuck.[17] May the government railroad be soon completed, so that more of us may glimpse these two great mountains!

Other Alaskan Peaks

Of the peaks of the magnificent range rising for nearly three hundred miles along the ocean Mt. St. Elias (18,024 feet) is the only one that has been climbed. Mt. Logan, the highest of the range (19,500 feet), in reality stands back from the rest and is just over the border in Canadian territory; but there are other dazzling peaks (the snow line is from 3,000 to 4,000 feet above the sea) to tempt the ambitious—Mt. Vancouver (15,676 feet), Mt. Hubbard (14,950 feet), Mt. Cook (13,755 feet), all near to St. Elias, and Mt. Fairweather (15,399 feet), Mt. Crillon (12,727 feet), and Mt. La Pérouse (10,756 feet), farther south. West of Mt. St. Elias the range divides, the lower Chugach Range (culminating in Mt. Gilbert, 10,194 feet) following the coast around Prince William Sound to the Kenai Peninsula, the other, the Wrangell Range, running northwest to the Copper River, culminating in Mt. Sanford (16,208 feet). Mt. Blackburn, the second in height (16,140 feet), was conquered by Miss Dora Keen[18] (now Mrs. Handy) in May, 1912. Mt. Wrangell, the only active volcano in the range, was climbed by Robert Dunn in July, 1908. There are five or six other peaks that rise over 10,000 feet.

The great Alaska Range, of which Mt. McKinley is the culminating point, extends from the Copper River in a great broad crescent westward for five hundred miles or more, well back from the coast. It has many high peaks, though none of them approach McKinley and Foraker.

The surveyors of the boundary commission that has recently marked out the line running north six hundred miles from Mt. St. Elias to the Arctic Ocean found, eighty or ninety miles north of St. Elias, a lonely and majestic snow peak, Mt. Natazhat (13,480 feet), crowning the top of an east-and-west range of the same name. This peak was climbed in June,

[17] Hudson Stuck: Ten Thousand Miles with a Dog Sled, New York, 1914; *id.*: The Ascent of Mount Denali (Mt. McKinley), New York, 1914.

[18] See Dora Keen: First Up Mt. Blackburn, *World's Work*, Vol. 27, 1913, pp. 80-101.

1913, by H. F. J. Lambart and three companions, though it did not yield upon the first attempt nor was it in an exactly docile mood when it was finally conquered.[19]

The Aleutian Range, on the Alaska Peninsula and the Aleutian Islands, forms a long line of active volcanoes, the highest of them being Mt. Spurr (11,069 feet), Mt. Redoubt (10,198 feet), and Iliamna (10,017 feet).[20]

With all of these glorious heights before him the mountaineer may well pray for a long and vigorous life.

[19] See H. F. J. Lambart: The Ascent of Mt. Natazhat (13,480 feet) in Alaska (1913), *Canadian Alpine Journ.*, Vol. 6, 1914-15, pp. 1-10.

[20] On the mountains in the southern half of Alaska see especially the admirable monograph by Alfred H. Brooks: Mountain Exploration in Alaska (Alpina Americana No. 3), American Alpine Club, Philadelphia, 1914.

DRAINAGE EVOLUTION ON THE YÜNNAN-TIBET FRONTIER*

By W. M. DAVIS

A recent article[1] on the drainage conditions in the region where the Salween, Mekong, and Yangtze are compressed within a space of 50 miles in their flow southward from the Tibetan Plateau is a bold, not to say a venturesome application of deductive geomorphology in an effort to give explanatory description of the river courses in a lofty mountain region. The trend of the main ranges and valleys, as well as the strike of the nearly vertical rock structures, on the Yünnan-Tibet frontier is about north and south; but certain first-order tributary valleys, trending in part east or west, also turn to southward courses for part of their length; and, as it is assumed that such tributary valleys must originally have had wholly east or west transverse courses, an explanation for their southward turns is sought. The explanation proposed points out that the heavy rainfall comes with southwest winds and that the climatic control of vegetation on the higher slopes favors erosion on their windward aspects; it is therefore concluded that second-order tributaries, heading northward, would capture and divert the upstream parts of first-order tributaries farther north, and thus southward turns in the tributary drainage would be developed.

Disregard of the Pre-Uplift History of the Region

The article is above characterized as bold, because it goes so much farther into deduction than is usual in British geographical essays; and for this the author deserves applause. The article is further characterized as venturesome, because the main postulate upon which its deductions are based is unwarranted; and for this the author ought to be cautioned. The unwarranted postulate is of a kind that is not infrequently met in the treatment of uplifted regions, in that it fails to take account of the form that the region had acquired by erosional processes before it was uplifted. It is here assumed without inquiry that "the natural course of every [first-order] tributary stream is [east or west] down the flank of the main divide"; that is that the mountain ranges, when first uplifted, had smooth lateral slopes, down which the first-order tributaries of the main rivers must have flowed in east or west consequent courses. In a word, the

* One of a series of "Notes on the Description of Land Forms," the latest of which appeared in the March *Geographical Review*, pp. 176-180, where a complete list is given of the preceding instalments.

[1] F. Kingdon Ward: The Hydrography of the Yünnan-Tibet Frontier, *Geogr. Journ.*, Vol. 52, 1918, pp. 288-299. [For photographs showing the topography of this region see *Geogr. Rev.*, Vol. 6, 1918, pp. 3, 12, 13, and 17.—Edit. Note.]

pre-uplift history of the region is not considered; no account is taken of a possible cycle of erosion preceding the current cycle. Yet, inasmuch as the general structure of the region is nearly vertical, and inasmuch as the features of the Tibetan Plateau farther north give many indications of geologically modern uplift after a prolonged period of erosion at a lower stand, the most reasonable assumption that can be made as to the pre-uplift form of the region is that it consisted of broad old valleys, drained for the most part by long streams well adjusted to belts of the least resistant rocks, between subdued hills and ridges of the most resistant rocks crossed by short transverse streams. In view of this manifest possibility, a reasonable inference as to the form and drainage of the region directly after uplift is that the pre-uplift form and drainage still persisted in a general way, although new slopes and reversals of drainage may have been introduced here and there by uplifts of unequal measure.

Probability of an Earlier Cycle of Erosion

Hence in this mountainous region, as in many others, the cycle of erosion that was introduced by the uplift to which the present altitude of the region is due is probably not a first cycle, previous to which no inquiry as to the development of river courses need be made. It is more reasonable to regard the erosion of the region as now in the early stages of a second cycle, at the beginning of which many river courses may have been inherited from a preceding cycle; and to regard the preceding cycle as having reached a far-advanced stage and as therefore having witnessed the adjustment of many streams to belts of weak structure. According to this view, a good number of the captures that are attributed by the author to the current cycle of erosion may well have taken place in the earlier cycle, and they may then have been determined more largely by variations of rock resistance than by the climatic factors which the author mentions as now operative. Unfortunately, the control exerted upon valley arrangement and form by resistant and weak structural belts is not recognized. Furthermore, the direction of the streams, and not the unlike resistance of structural belts, is taken to control valley width, as is seen in the statement that "as long as the stream follows the strike, the tendency is for it to cut a broad valley; when it cuts across the strike the tendency is for it to cut a narrow jagged-edged gorge." Again no account is taken of Campbell's principle, according to which the captures that have taken place during the current cycle may have been more largely influenced by a southward tilting of the region during its uplift—for the ranges decrease in height southward—rather than by climatic factors.

Hanging Valleys

Certain other items of interest may be noted. Waterfalls from hanging valleys are explained as due in some instances to the "overdeepening

of the main valley by water while the tributary valleys were filled by ice''—a discredited process—and in other instances to the deepening of a main valley as a result of increase in its river volume by capture farther upstream; but a special feature, namely an extreme narrowness of the main valley, which should accompany waterfalls from tributaries thus left suspended, is not mentioned; nor is reference clearly made to the much more effective cause for hanging-valley waterfalls in mountainous regions that is provided by the glacial overdeepening of the main valleys, although allusion is made to the broadening of certain valley heads by glacial action.

Incised Meanders

One of the larger rivers turns ''backwards and forwards on itself, loop lying against loop in a deep gorge through a mountain range.'' Such looping ''would, of course, occasion no surprise in the case of a river meandering across a flood plain, but when it rushes through deep gorges . . . . the effect is staggering.'' A special explanation is therefore demanded; but in the explanation offered no account is taken of the very possible inheritance of the loop embryos from a meandering course developed during an earlier cycle of erosion, although such an explanation for the incised meanders of the Wye in western England, of the Seine in northwestern France, of the Meuse through the Ardennes, and of the Mosel between the Hunsrück and the Eifel has long been current.

Recent Renewal of Uplift

The term ''reversed'' is used in a new and peculiar sense, in being applied to a tributary valley that, unlike ordinary valleys, which are narrow toward the head and broadly opened farther downstream, is broadly opened at its head and narrowed to a chasm at its confluence with the deeply incised valley of its trunk river. It is suggested that the broadening of the valley head may have been accomplished by glacial erosion, but nothing is said as to the possibility of a recent renewal of uplift as a cause of the deep incision of the lower valleys. Thus the author, who is very properly more interested in his Far East field of observation than in a review of pertinent literature, has repeated, in his discussion of these several items as well as in his main discussion, the unadvisable course of certain American observers, who fifty years ago were so overwhelmed by the novelties of our Far West that they described them without reference to the explanations and the terminology that had been previously suggested for similar though less striking features by stay-at-home students in older-settled regions.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Presentation of the Cullum Geographical Medal to Emmanuel de Margerie. The presentation to Emmanuel de Margerie of the Cullum Geographical Medal, whose award to this eminent French geographer by the American Geographical Society was announced in the April *Review* (p. 262), took place at the United States Embassy in Paris on May 27. The presentation was made by Ambassador Hugh Campbell Wallace. In addition to members of M. de Margerie's family there were present representatives of various learned institutions of Paris as well as members of the American commissions at the time in the French capital, including Dr. Sidney E. Mezes and Professor Mark Jefferson of the American Commission to Negotiate Peace and Major D. W. Johnson.

In presenting the medal Ambassador Wallace made the following remarks:

"Ladies, Monsieur de Margerie, and Gentlemen: I have the honor to be requested by the Council of the American Geographical Society, and the very great pleasure, to be its representative in presenting the Cullum Gold Medal of the Society to M. Emmanuel de Margerie of Paris for his most conspicuous services to the science of geography. The international reputation of M. de Margerie makes unnecessary and superfluous any words of mine concerning his earnest and successful effort. No geographer or geologist in France has given so much assistance to the American Expeditionary Forces, and his co-operation with the Geographical Section of the Army will not be forgotten by any who have come in contact with it.

"Sir: It is with sincere appreciation of the privilege I enjoy in representing the American Geographical Society in such an entirely justified and pleasing recognition of your work that I beg you to accept this medal."

The Ambassador thereupon presented the medal, the inscription on which reads as follows:

TO EMMANUEL DE MARGERIE
FOR "LA FACE DE LA TERRE"
DISTINGUISHED FOR PROFOUND SCHOLARSHIP
AND THE RARE GRACE OF A MODEST SPIRIT

In accepting the medal M. de Margerie spoke as follows, graciously couching his remarks first in French and then in English, which he commands with perfect ease:

"Monsieur l'Ambassadeur: Aucun honneur ne saurait être plus agréable à un géographe français, en ce moment de l'histoire du monde, que d'être choisi comme lauréat par la grande Société de Géographie dont le siège est à New York.

"En m'attribuant l'une de ses deux médailles d'or, cette puissante association vient consacrer officiellement les liens d'échange intellectuel et d'affectueuse sympathie qui m'unissent, depuis bien des années, à de nombreux représentants de la science américaine.

"Qu'elle soit remerciée, par votre bouche, de cet acte généreux, dont les maîtres et les amis qui m'écoutent sentent certainement, comme moi, tout le prix, car, à travers ma modeste personne, c'est à mon pays que va ce témoignage si flatteur!

"En parcourant la liste des titulaires de la médaille Cullum, je suis particulièrement heureux d'y relever le nom d'un de mes compatriotes, le Dr. J. B. Charcot, et celui du plus éminent des géographes vivants des Etats-Unis, l'infatigable professeur W. M. Davis, dont tous, à des degrés divers, nous sommes les élèves.

"Mais je crains qu'une bienveillance excessive n'ait dicté à la Société sa decision, quand je vois pour me précéder tant d'hommes illustres, les Moreno, les Nansen, les Scott, les Shackleton, les Peary, et plusieurs autres, dont l'existence tout entière n'a eu qu'un but: faire disparaître de la carte du globe les taches blanches qui subsistaient avant leurs travaux.

"En effet, si les circonstances m'ont permis de fréquents voyages a l'étranger, je n'ai jamais parcouru que des routes très banales, et il n'y a pas un seul kilomètre d'itinéraires nouveaux qui puisse être versé au dossier de l'exploration en mon nom.

"C'est donc à un autre aspect des études géographiques que s'adresse l'insigne marque d'encouragement dont je suis, aujourd'hui, le bénéficiaire. C'est, si je ne me trompe, à la critique des idées et des faits, à la diffusion des résultats acquis, à l'élaboration des principes et des méthodes.

"Sans m'étendre sur la portée de cet effort, vous me permettrez d'insister sur le constant appui que j'ai trouvé, depuis près de quarante ans, auprès des savants américains et des institutions scientifiques qui font la gloire des Etats-Unis.

"Ever since the days of my boyhood the work of the scientific pioneers in the West has exerted on my thoughts and feelings a fascination of its own. It was my privilege, in 1891, to meet personally some of these great men: Dana, Whitney, Clarence King, Major Powell, Gilbert, Holmes, and several of their associates, and to receive, as it were, inspiration from their active genius. When, twenty-one years later, I had the honor to give an address, in English, to the members of the American Geographical Society assembled in New York, there could not remain any doubt in my mind as to the subject I was to choose: 'The Debt of Geographical Science to American Explorers.' If I have contributed to make better known some of their achievements among French geographers and geologists, that is a mere trifle in comparison with the benefit I have found myself in the perusal of their work.

"During the last three years I had more than once the pleasure of receiving the visit of friends from the other side of the ocean, most of them members of the Society, but not always identified at once under the military dress of the time. The very meager help I could give them in matters connected with their official duty gave me an occasion to see something of what 'American efficiency' could be, in those heroic days.

"I shall never forget the enthusiasm and unselfishness of these gallant men. Major Johnson, whom I am glad to see in this audience, can take for himself a good part of that compliment. Let me name also my friend Dr. Isaiah Bowman, whose departure from Paris, a short while ago, remains a source of deep regret to me—as he is responsible, I believe, for the delicate and most charming words engraved on the medal which I am receiving from the hands of Your Excellency.

"And now, Mr. Ambassador, let me add a few words to convey to yourself the expression of my deep personal feelings of gratitude and to excuse myself for having encroached upon your time in a moment when the hours are, perhaps, more heavy for responsible men than has ever been the case before.

"Vive la science américaine! Vive les Etats-Unis!"

NORTH AMERICA

The Deepest Well in the World: A New Record. Until very recently the two deepest borings into the crust of the earth were a well near McDonald, Pa., 14 miles west of Pittsburg, which measured 7,248 feet, and one at Czuchow in Upper Silesia, Germany, where a depth of 7,349 feet had been reached. These marks have now been passed by a well sunk near Clarksburg, in the northern part of West Virginia, in a futile attempt to reach the rich gas-bearing and petroliferous "Clinton" (Medina) sand, which extends across eastern Ohio and is thought to underlie this region. A final depth of 7,386 feet was reached. The failure to reach the oil and gas horizon was due to the unexpected thickening of the Devonian shales, one of the overlying series, and to the parting of the cable 2,000 feet above the bottom when this depth had been reached ("Discussion of the Records of Some Very Deep Wells in the Appalachian Oil Fields of Pennsylvania, Ohio, and West Virginia," by I. C. White, with temperature measurements by C. E. Van Orstrand: introduction to D. B. Reger: Barbour and Upshur Counties and Western Portion of Randolph County, *West Virginia Geol. Survey County Repts.*, 1918, pp. xxv–ciii).

Interesting data regarding the rate of increase in underground temperature have been yielded by the operation and by similar borings in the same field. It was found that at a depth of 7,000 feet the temperature had risen to 172° F. and that the rate of increase at that depth was about 1° F. in 51 feet. Mr. Van Orstrand estimates that the boiling point would be reached at somewhere near 10,000 feet below the surface. The rate of temperature increase (1° F. for each 51 feet of descent) is about the average ascertained by the Committee on Underground Temperatures of the British Association for the Advancement of Science (e.g. *Rept. for 1889*, pp. 35-40; *1895*, pp. 75-77; *1901*, pp. 64-71; *1904*, pp. 51-55), though the rate is far from uniform, varying from 1° F. in less than 20 feet to 1° F. in 130 feet. In this portion of the Appalachian district there has been little movement of the strata since their deposition, hence the temperatures recorded are of peculiar interest. For data regarding temperatures recorded in earlier borings in the same region see W. Hallock: Subterranean Temperatures at Wheeling, W. Va., and Pittsburgh, Pa., *School of Mines Quarterly*, Vol. 18, 1897, pp. 148-154.

The Vegetation of the Dry Tortugas. Among the "Papers from the Department of Marine Biology of the Carnegie Institution of Washington" in Vol. 12, 1918,

is one (pp. 111-138) of peculiar geographical interest on the "Botanical Ecology of the Dry Tortugas," by H. H. M. Bowman. It will be remembered that on one of these small islands, which lie 70 miles west of Key West, the Carnegie Institution maintains its Marine Biology Laboratory, established in 1904. These islets, ten in all, are of coral formation and have grown roughly crescent-shaped through the action of wind-formed currents, the Florida countercurrent, and the movement of tides. They rise only slightly above the surface of the water and vary little in either climate or soil. Except the general survey of the vegetation of the entire Florida Keys conducted by E. O. Lansing in 1904, the results of which were published in 1907 by C. F. Millspaugh (Flora of the Sand Keys of Florida, *Field Columbian Museum Publ. 118: Bot. Ser. 2, No. 5*), no other recent study of the vegetation of these islands has been made.

The flora of the Dry Tortugas is strikingly different from that of the keys farther east, partly because of their isolation, partly because of the character of the soil. The mangrove, a characteristic form in the other islets, is almost entirely lacking in the Tortugas, where both soil and air are too dry to favor its growth. All plants of the islands may be classified as strand flora. They owe their origin to the adjacent West Indies, from which they have probably been carried by the currents referred to. Contrary to the opinion expressed by Millspaugh, the author finds that birds have had little influence in the distribution of plant life. Though the Tortugas have been a United States Bird Reservation since 1908 and though they are densely populated with terns during the breeding season, the food upon which these birds subsist is chiefly fish, and they seem to have affected plant life only to a small extent.

As the islands possess no springs and as the soil is so porous that it retains little moisture nearly all plants show some special adaptation to guard against the loss of water.

The Associated Mountaineering Clubs of North America. The organization known as the Associated Mountaineering Clubs of North America was founded in 1916 with nine clubs and societies; there are now twenty-nine, with an individual membership of over 45,000. In addition to the leading mountaineering and outdoor clubs of the continent, the association includes some societies whose activities are of a somewhat different character. Uniting them all, however, there is the common bond of interest in the preservation of our finest scenery and in the protection of tree, plant, flower, bird, and animal life in its natural environment.

The association is working in co-operation with the National Park Service for the creation and development of our National Parks and Monuments. First in the hearts of all true mountaineers and travelers is the preservation of our most beautiful scenery from commercial ruination. In the annual *Bulletin* of the association attention is called to the activities of the various departments of the Government of value to the mountaineer and traveler. The claims of various regions to become National Parks and Monuments and the proposed enlargements of existing parks are presented. As these projects come up for governmental consideration the association presents the views of its members and also gives wide publicity to the plans of the Government.

The association acts as a clearing house for interchange of information on mountaineering and on National Parks and Monuments. Its *Bulletin* contains information as to the officers, number of members, dues, publications, outings, and other matters of interest, of the organizations belonging to the association. A large collection of literature has been formed, by combining, in the building of the New York Public Library, the books of the American Alpine Club and the mountaineering books in the New York Public Library, and bibliographies are being compiled and published. A collection of mountain photographs has been gathered to supplement the literature of various regions. Many mountaineering and outdoor books have been secured free of charge for the libraries of the members of the association. Public attention has been called to many important but little-known scenic regions by illustrated articles in leading periodicals and by illustrated lectures which have been given before many leading clubs and societies.

LE ROY JEFFERS

AUSTRALASIA AND OCEANIA

Hawaiian Climate and White Residents. Though it is a generally accepted idea that prolonged residence within the tropics impairs the vitality of the white race, Professor Vaughan MacCaughey, in an article contributed to *Science* (Jan. 10, 1919, pp. 44-46), maintains that there is little ill effect experienced in the Hawaiian Islands. Americans, even those families who have lived there for several generations, seem to retain the same vigor and energy as people in the "States." Business hours, length of working day, holidays, and vacations follow the customs of the continental United States. School children and college students appear capable of doing work equal in amount and quality to that accomplished in the temperate zone. Though white labor

does not now exist on the islands, yet in earlier days, before the advent of Oriental workmen, white men worked in the fields with no apparent ill effect. In energy, leadership, and intellectual activity the resident whites have suffered little, if any, deterioration.

Professor MacCaughey accounts for this by supposing that the oceanic influence, intensified by the presence of cool currents and strongly developed trade winds, which render the climate more truly temperate than tropical, counteracts any deleterious effect which life within the torrid zone might otherwise have. This contention is upheld by Dr. Titus M. Coan in his paper "The Climate of Hawaii," published in Cohen's "System of Physiologic Therapeutics" (Vol. 4, pp. 223-241, Philadelphia, 1901). It serves as an excellent illustration of the fact that the true boundaries of zones are isothermal rather than latitudinal: that even within the tropics climatic conditions are often far from "tropical."

The Rainfall of Honolulu. In a recent paper on the cumulus clouds which form in the trade winds over the Koolau Mountains on the island of Oahu, Andrew M. Hamrick calls attention to the striking differences in the rainfall amounts within short distances on that island (*Monthly Weather Rev.*, Sept., 1918). If Oahu were a low, level island, it would be a desert. By a fortunate arrangement of the topography the Koolau Mountains lie at right angles to the trade winds and are of sufficient height to cause not only the huge cloud cap which is so striking a characteristic of the region but also a very considerable rainfall. In the business district of Honolulu, which is about 5 miles from the crest of the mountains and to leeward of them, the mean annual rainfall is about 25 inches. Three miles northeast of the city, about halfway to the summit of the mountains, it is 100 inches. The cloud, which hangs with remarkable steadiness over the mountains, is sometimes blown far enough to leeward to give rain in Honolulu, though the sun is shining brightly over that city. These showers are locally termed "liquid sunshine." The moisture from the cloud cap favors the growth of dense vegetation on the mountains. Similar conditions are found on the other large islands of the group. Sufficient water is collected from the clouds to supply the irrigation ditches upon which most of the agriculture of the Hawaiian Islands depends.

R. DeC. WARD

OCEANS

The Meteorological Aspects of the Recent Transatlantic Flights. With transatlantic flight actually accomplished, the problem of intercontinental air voyages has apparently resolved itself into a question of selecting lines of travel where meteorological factors are favorable or of waiting for suitable weather conditions along a desired route. Machines are able to carry the required fuel, and aviators have proved themselves capable of the protracted strain involved. It will always be necessary, however, carefully to select the routes and the times that offer favorable meteorological conditions. This will be the case whether outlying points, such as St. John's and Trepassey Bay, be used for transoceanic air-service ports or whether, with the experience now being gained, it be possible to make the start from the great ports already developed as termini of steamer routes. A thorough consideration of meteorological conditions is requisite not only for the safety of machines and passengers but also because speed and the consequent cost in time and fuel for each voyage depend upon the force and the direction of wind and other favorable atmospheric conditions.

The *Monthly Weather Review* for February, 1919 (pp. 65-75), contains a discussion of "Trans-Atlantic Flight From the Meteorologist's Point of View" by W. R. Gregg, one of the meteorological experts actively concerned with the flight of the U. S. Navy planes. Though the subject is considered in relation to the then still unaccomplished first flight, the conclusions reached apply in a general way to succeeding voyages. Two routes only are considered of great present importance for the flight from North America to Europe; those taken respectively by the English and the American aviators in the journeys recently made. Though the route from Newfoundland to the Azores was considered most practicable for an initial venture because of the shorter distances to be covered in the individual "hops," that from Newfoundland to Ireland is found to offer more suitable days in the year for the eastward flight. A careful comparison of meteorological conditions as revealed in the daily marine synoptic weather maps for the years 1906-1915, inclusive, showed that the northern route offers 127 days per year and the southern route 101 days per year favorable for the eastward voyage. For a return the southern route offers but 35 days annually and the northern route even less, containing on an average only 17 suitable days. However, all estimates of weather conditions high above the Atlantic are based chiefly upon free-air observations made in the eastern United States and western Europe, combined with our knowledge of

surface conditions on the ocean, since few actual observations have been made in the upper air over the sea.

In flying over the ocean, at an elevation of from 500 to 1,000 meters, the temperature is likely to be quite constant throughout the year. In the upper air, as on the surface of the sea, there are not such extremes as on the land. Even during winter it is thought that the temperature at 1,000 meters above the sea seldom falls much below freezing, while throughout other seasons the temperature must be milder still and, of course, never high enough to cause discomfort from heat.

The meteorological conditions of greatest interest in transatlantic flying are wind (velocity and direction) and cloudiness (including fog). The experience of the American and British aviators in their transoceanic flying reveals the fact that the latter factor is of supreme importance. Fog and cloud are considered in Gregg's paper as of relatively slight import and are thought to affect only the matter of locating the landing place. This would seem to be the case, too, in the "Report of the British Civil Aerial Transport Committee" (London, 1918), since this treatise also discusses fog chiefly in relation to the difficulty in landing (see the note on this report in the *Monthly Weather Rev.*, Feb., 1919, p. 80). But practical aviators have encountered the difficulty of steering in clouds, finding it extremely hard to recognize either horizontal or vertical directions, if the compass card becomes unsteady, as often happens. Even the bubble is of little assistance, as centrifugal force counteracts gravity (see "Danger in Flying Through Clouds", abstract of a paper read before the Aeronautical Society of Great Britain by Captain B. C. Hucks, *Scientific American Suppl.*, June 15, 1918, p. 375). In fact the greatest difficulty encountered by the American naval airmen Towers and Read in their flight to the Azores on May 16 was the impossibility of navigating at high speed and yet keeping true to the course when enveloping clouds made the horizon line difficult to determine. The use of an artificial horizon by which it was thought this danger might be overcome has not proved entirely practicable. When the bubble becomes unreliable an aviator must get his bearings not on a circle but on a sphere, since he may be traveling toward any point of the compass, and upward or downward at any angle without being able to know what position his machine is taking relative to the cardinal points or the ground. In fact, he has six cardinal points instead of four, with danger close at hand in at least one direction. Yet he must keep moving at a high speed; so he must know, and know quickly, in which direction to bear. The British in their successful non-stop flight on June 14-15 experienced these difficulties, finding cloud and fog along a great part of their way. Yet occasional glimpses of the water enabled them to calculate their speed and drift and so to steer true to their course. In the first part of the journey icebergs, whose color stood out clearly against the dull drab of the ocean, were found to be of service in making these reckonings.

In regard to winds, the aviator, while far from being absolutely dependent upon them, will always be greatly helped or hindered by their force and direction. As is now well known the movements in the upper air are more constant and usually stronger than the surface winds. Above 500 to 1,000 meters the prevailing westerlies of temperate latitudes can be depended upon. But up to this height the aviator must take into account surface currents, less irregular, of course, over the ocean than over the land, and less variable, because cyclonic centers at sea lose much of their intensity. Over the North Atlantic these surface currents, changing with the passing of extratropical cyclones, tend to flow parallel to the isobars. Consequently an aviator finds favorable wind conditions when the isobars lie parallel to the course he wishes to follow. This happens for the southern route, viz. from Newfoundland to Portugal, when a center of high pressure lies about latitude 30° to 40° N., central in the region of Bermuda, with crest extending eastward, and when a low is situated some 1,000 kilometers east of Newfoundland in about 50° N.

This is the combination apparently sought by the American naval aviators for their venture, and the measure of success attending that initial flight was largely due to the Weather Bureau's forecast of this favorable combination. A center of low pressure, which had moved slowly out of the Gulf of St. Lawrence, had passed northeastward to approximately the position above mentioned, while an area of high pressure had crossed behind this low center, had moved east by south, and apparently was located near Bermuda on May 16, when the seaplanes started. This would result in southeastward winds most of the way to the Azores and eastward winds from there to Portugal. The British flyers Hawker and Grieve, awaiting favorable conditions for their flight northeastward to Ireland on May 18, had to wait until the low center had passed farther northeast and until the winds accompanying it were blowing in that direction over at least a part of the northern course. In their natural ambition to reach Europe first, they seem to have started somewhat too soon and to have run into local storms that were developed on the southernmost extension of this low barometic

center. A delay of another 12 hours would probably have given them better weather conditions. In the later successful flight made by the British aviators Alcock and Brown over the northern route on June 14-15, an extensive area of high pressure, which had dominated meteorological conditions off the Newfoundland coast for several preceding days, gave them strong westerly winds over the entire course, enabling them to attain an average speed of over 120 miles an hour.

In conclusion it would seem that two requirements must be met for successful transoceanic travel: first, more accurate forecasting of meteorological conditions in mid-ocean, since all fliers have reported unexpected weather. This can be accomplished only with more complete knowledge of surface and upper-air conditions over the sea, secured perhaps, as Commander Read has suggested, by means of a line of permanently posted ships which will serve as ocean meteorological stations; perhaps by some such system as that being instituted by the British Admiralty, whereby ships passing certain specified points on the high seas at predetermined hours shall report their observations by wireless to central stations, which in turn will issue frequent forecasts covering practically the entire ocean (see the following note). To the greater acquaintance with free-air conditions at sea aviators themselves will no doubt contribute largely. The second requirement is improved means of navigating when the horizon is invisible. The flights recently made demonstrate that until some feasible appliance for this purpose is devised aviators will run the risk not only of delay, or of being driven far out of their course, but also of being lost at sea, through inability to get correct bearings.

Ocean Weather Reports and Forecasts for Aviators. According to *Symons's Meteorological Magazine* for May, 1919 (p. 37), it is announced that the British Admiralty, through the Meteorological Office, is establishing a system by which weather conditions will be reported by wireless three times a day from ships in all parts of the world. In return, wireless bulletins will be issued from 42 widely separated transmission stations, either giving an official statement of existing conditions or forecasting the weather for particular regions. Co-operation on the part of the other nations will be sought, perhaps to the extent of obtaining international "silent periods" for the hours 1 A. M., 7 A. M., and 1 P. M. (mean Greenwich time) when signals are being sent, in order thus to facilitate the operation of the system. In the northeastern Atlantic six or seven points are being fixed, and ships in the vicinity of these points at the indicated hours will be asked to furnish reports. This work will become of greatly increased value with the development of the intercontinental air voyages now expected. Aviators, on their part, will also probably contribute reports of upper-air conditions. The successful operation of such a plan should add vastly to our present meager knowledge of ocean meteorology.

GEOGRAPHICAL NEWS

The Centennial Number of the *American Journal of Science*. The July, 1918, issue of the *American Journal of Science* is a Centennial Number, in celebration of the hundredth anniversary of the founding of this publication. The papers of particular interest for geographers are the three under the general title "A Century of Geology" and that on "A Century of Government Geological Surveys." This last is by George Otis Smith, Director of the U. S. Geological Survey. The other three are "Historical Geology," by Charles Schuchert; "Steps of Progress in the Interpretation of Land Forms," by Herbert E. Gregory; and "The Growth of Knowledge of Earth Structure," by Joseph Barrell. Each paper traces the development of its respective branch during the last one hundred years, giving particular, but not exclusive, attention to American science. A special volume, reproducing this number of the *Journal*, with important additions, is being prepared for publication by the Yale University Press. This series of papers forms a valuable record of the achievement in the field of geology during what is practically the first century of American science.

Resumption of Publication of *Le Mouvement Géographique*. This weekly periodical, founded in 1884 by the late A. J. Wauters (who died in Brussels on March 25, 1916), has resumed publication after four years of enforced silence, beginning with the issue for January 5, 1919 (Vol. 32, No. 1). It continues its original policy of contributing toward the popularization of geography, giving especial attention to Belgian interests and operations in the Congo. Among other important articles contained in recent numbers are: "L'état actuel des passes du bas Congo" (March 9) and "L'histoire économique du Congo depuis 1914" (May 4), the latter being an address delivered in the Institut Solvay by J. Geerinckx.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

UNITED STATES

South-Central States

LOWE, E. N. **Mississippi: Its geology, geography, soils, and mineral resources.** 335 pp.; maps, ills., index. *Mississippi State Geol. Survey Bull. No. 12.* Jackson, 1915. 9 x 6½.

This is a popular treatise on the geography of the state by the state geologist (who is a native of Mississippi and writes from long experience), mostly a reprint and revision of his *Bulletin 8*, on soils, with about 100 additional pages from other sources. Besides the topics indicated in the title and relating exclusively to Mississippi, there are about 55 pages on the formation of rocks and soils, historical geology in general, soil classification and management, and soil erosion; most of which will doubtless be useful to readers not provided with geological textbooks.

The state is very diversified, in spite of the absence of mountains, and is divided by Lowe into nine or ten "physiographic regions"; but the map of them on page 164 is entitled "soil regions," and it harmonizes perfectly as far as it goes with the colored geological map at the end of the volume and differs from the map of "forest regions" in *Bulletin 7* in only three or four of its boundaries and from that of the "soil and floral regions" on page 138 of *Bulletin 11* in the addition of only one line (separating the "pine meadows" along the coast from the long-leaf pine hills). There is little inconsistency in this, however, for geology, topography, soil, and vegetation are pretty closely correlated in Mississippi, as Hilgard showed long ago; but it would have been just as well to say natural or geographical regions.

Except for a small area of Paleozoic rocks in the northeastern corner, Mississippi is all underlain by Cretaceous and later strata of the Coastal Plain, and the different formations crop out in chronological order in approximately concentric belts, with the oldest at the northeast and the youngest along the coast, except for the broad "Yazoo delta," or Mississippi River flood plain, on the western side of the state.

As in *Bulletin 8* (published about two years earlier), a little more than 100 pages is devoted to the description of the nine regions. The order of treatment for the larger regions is: boundaries, topography, soils, native vegetation, agriculture, and recommendations for improving farm practices. Under the head of soils there are usually mechanical and partial chemical analyses of one or two typical samples (localities not specified), the mechanical analyses taken from government soil surveys and the chemical analyses mostly from Hilgard's reports in the Tenth Census and earlier. The vegetation is described in more detail than one usually finds in geological and geographical publications (doubtless on account of the excellent example set by Dr. Hilgard in his reports on the same state) and with technical names of the plants given in most cases, but the treatment is not very thorough or scientific. There is too little indication of relative abundance; native plants and weeds are not always distinguished; some of the species are wrongly identified; and a rather antiquated nomenclature is used, with some essentially fictitious English names taken from Northern books rather than from local usage.

Under the head of agriculture it would have been very appropriate to mention the proportion of cultivated land in each region and the average expenditure per acre for fertilizers, which in 1909-10 varied (inversely with soil fertility) in different regions from less than a cent in the "delta" to over $2 in the three coast counties. Some regional statistics of density and color of population, rate of increase, value of farm land and buildings, etc., would also have brought out some interesting contrasts and taken up little space.

From a geographical point of view it would have been better to separate the western parts of the north-central plateau and long-leaf pine hills, which are covered with loess or something akin to it, from the loess-free eastern portions, instead of adhering strictly to the boundaries of the Tertiary formations, for the loess makes a considerable difference in soil fertility and therefore in vegetation and civilization. From limited observations in the field the reviewer is inclined to believe that a strip 15 or 20 miles wide at the northern edge of the long-leaf pine hills, north of an unmapped cuesta just south

of Ellisville, could be correlated with the lime-sink region of Alabama, Florida, and Georgia. The islands along the coast are not considered in the regional descriptions nor shown at all on the outline map; but if they were a little larger they would deserve to be treated as a distinct region.

Climate is discussed in a chapter by itself, covering less than two pages, which seems inadequate for such a diversified area. In the northwestern portion of the state, where the richest soils are, most of the rain comes in winter and spring; while in the extreme south, where poor sandy soils and long-leaf pine forests prevail, late summer is the rainy season. April, May, October, and November are generally the driest and pleasantest months throughout the state. Nothing is said in the chapter on climate about floods, tornadoes, and hurricanes, whose frequency varies greatly in different regions; but floods and tornadoes are most frequent in the regions of rich soil (and still more so in other states farther up the Mississippi Valley), and hurricanes in the late summer rain belt near the coast.

In the appendixes are 76 very incomplete soil analyses (which do not even mention potash, lime, magnesia, or iron), a table of population of the counties and principal towns in 1900 and 1910, about two pages of agricultural and manufacturing returns for the state as a whole (taken from the latest U. S. Census), an alphabetical list of nearly 400 places whose altitudes are known, a list of fossil localities, and notes on navigable streams. The highest town mentioned is Holly Springs, 602 feet above sea level; but there are many exceeding 400 feet even in the southern half of the state.

In spite of its minor shortcomings, this bulletin will doubtless serve a useful purpose in putting a large store of important facts about their environment within easy reach of citizens of the state who have little acquaintance with scientific literature.

ROLAND M. HARPER

GRONERT, T. G. **Trade in the blue-grass region, 1810-1820.** *Mississippi Valley Hist. Rev.*, Vol. 5, 1918, No. 3, pp. 313-323. Cedar Rapids, Iowa.

WINTER, N. O. **Texas, the marvellous.** xii and 343 pp.; map, ills., bibliogr., index. The Page Co., Boston, 1916. $3.00. 9½ x 6½.

—— [*Topographic map of the United States.*] 1:62,500. Sheets: (1) ***Bullis Gap***, (2) ***Dove Mountain, Tex.*** U. S. Geol. Survey, Washington, D. C., 1918.

MEXICO AND CENTRAL AMERICA

CALVERT, A. S., AND P. P. CALVERT. **A year of Costa Rican natural history.** xix and 577 pp.; maps, ills., bibliogr., index. The Macmillan Co., New York, 1917. $3.00. 9 x 6.

Costa Rica, in relation to her geography and natural history, is one of the most thoroughly investigated sections of Central America. Her situation on both watersheds of the continental divide gives her the rare privilege of presenting within a small area the two main climatic types of the tropics, that is to say perennial rain on the Atlantic slope and well-differentiated seasons—a dry one lasting from December to April and a wet one covering the remainder of the year—on the slope looking toward the Pacific. The topography of the country is unusually irregular, ranging in altitude between sea level and 3,800 meters.

In consequence of such favorable conditions the small territory of Costa Rica offers an epitome of the whole of tropical America, with widely diversified flora and fauna, in which plants and animals of the surrounding countries are largely represented in association with a strong endemic contingent.

It is not strange, therefore, that such a country should have long attracted the attention of naturalists and geographers, the results of whose investigations form an already extended series of scientific contributions. The delightful book in which Mr. and Mrs. Philip P. Calvert now present the results of their special work during one year of residence in Costa Rica is a valuable addition to the list. Besides detailing in many captivating pages their interesting observations of insect and plant life, the work includes a good general description of the central part of the republic and a vivid account of the tremendous earthquake of 1910, which resulted in the complete destruction of Cartago and of which the authors were unwilling witnesses.

From the geographic standpoint the most interesting chapters are those containing the narrative of an excursion to Guanacaste, the northwestern province of Costa Rica, situated between the great continental divide and the Pacific Ocean. These chapters are full of valuable descriptive information about this little-known section. Guanacaste seems to have been the southernmost point reached by the migratory flow descended from the Mexican plateau; it has kept to this day many customs and traditions which

ought to be thoroughly investigated and recorded before they disappear entirely. The only subject thus far which seems to have attracted foreign explorers is the extensive graveyards of Nicoya, which are full of the highly prized relics of the Chichimecas but which represent only one side of a vast and as yet unexplored field teeming with folklore and alluring legends. The native customs, the local names of plants, animals, and places all have kept to a degree the imprint of these northern immigrants of far-away times. Furthermore, Guanacaste is noted for the picturesqueness of its landscapes interspersed with clear forests and savanas. Mr. Calvert, who took this trip in company with a traveling school board, repeatedly refers to the presence in almost every village of a formally built and well-kept schoolhouse, a feature which speaks highly of the progress of the country.

An extensive list of the scientific literature bearing on Costa Rica is included in the volume. Considering the variety of subjects touched upon by the authors, the inaccuracies are remarkably few. This work, stamped throughout with the sympathetic personal characteristics of the authors, will henceforward occupy a prominent place by the side of Belt's "Naturalist in Nicaragua," Wallace's "Tropical Nature," Spruce's "Botanist on the Amazon and Andes," and others, in the library of every student of tropical America. H. PITTIER

FLORES, TEODORO. **El tequesquite del Lago de Texcoco.** 61 pp.; map, ills. *Anal. Inst. Geol. de México No. 5.* Secretaria de Industria, Comercio y Trabajo, Mexico, 1918. [A peculiar saline material found in lacustrine deposits at several localities on the Mexican plateau.]

FOYE, W. G. **Notes on a collection of rocks from Honduras, Central America.** Map. *Journ. of Geol.*, Vol. 26, 1918, No. 6, pp. 524-531.

GALLO, JOAQUÍN. **La unificación de la hora en México.** *Bol. Soc. Mexicana de Geogr. y Estadística*, Vol. 7, 1918, No. 8, pp. 461-465. Mexico.

GARCÍA Y ALVA, FEDERICO. **Sonora y sus elementos naturales de riqueza: Su estado actual.** Ills. *Bol. Soc. Mexicana de Geogr. y Estadística*, Vol. 8, 1918, No. 1, pp. 151-203. Mexico.

SOUTH AMERICA

ECUADOR, PERU, BOLIVIA

REID, W. A. **Bolivia, the heart of a continent: A few facts about the country and its activities.** 54 pp.; map, ills. Prepared for the Bolivian Legation, Washington, D. C., 1916. 9 x 6.

A booklet chiefly of value to the traveler, giving in compact form the elementary facts about the country and its resources. It is accompanied by a map "showing forest and agricultural areas and mineral localities" on the scale of 65 miles to the inch. But the "agricultural areas" are not really shown. At least if the one color which might indicate them is so interpreted, then the cold *salinas* of the *altiplano* are "agricultural", and with them would be classified some of the highest and most barren peaks of the Central Andes. And why a forest at Potosí? Prepared for the Bolivian Legation, it ought to be the most reliable report that could be prepared; the map is an unworthy production.

LAVALLE Y GARCÍA, J. A. DE. **La contracorriente ecuatorial como causa determinante del fenómeno marino conocido con el nombre de "Aguaje".** *Bol. Soc. Geogr. de Lima*, Vol. 33, 1917, No. 3, pp. 313-330. [In the Bay of Callao and at other places on the Peruvian coast there occurs a phenomenon involving change in the color of the sea water and emanations of sulphureted hydrogen. The phenomenon is known to take place during the months December to April, the period during which the equatorial countercurrent is experienced. The normally cool waters off the coast of Peru abound in plankton. The organisms are susceptible to sudden and great changes in temperature such as take place when the countercurrent is developed. Under such circumstances the plankton is killed in great quantities, producing a turbidity of the water. Accumulated in the shallow bays, the plankton decomposes and gives rise to the gaseous emanations. Such is the explanation advanced here; actual proof must depend, as the author says, upon the collection of hydrographic data.]

MEANS, P. A. **Social conditions in the Piura-Tumbes region of northern Peru.** Ills. *Scientific Monthly*, Vol. 7, 1918, No. 5, pp. 385-399.

MILLER, L. E. **A glimpse into the Quichua country of southern Bolivia.** Ills. *Amer. Museum Journ.*, Vol. 17, 1917, No. 6, pp. 407-415.

NORDENSKIÖLD, ERLAND. **Die Bevölkerungsbewegung unter den Indianern in Bolivien.** *Petermanns Mitt.*, Vol. 63, 1917, April, pp. 108-112. [Abstracted in the *Review*, Vol. 4, 1917, p. 487.]

NORDENSKIÖLD, ERLAND. **Die östliche Ausbreitung der Tiahuanacokultur in Bolivien und ihr Verhältnis zur Aruakkultur in Mojos.** Ills. *Zeitschr. für Ethnologie*, Vol. 49, 1917, No. 1, pp. 10-20. Berlin.

—— **Peru: General descriptive data.** 31 pp.; ills. Pan American Union, Washington, D. C., 1916.

PORTOCARRERO, J. N. **Informe sobre el Valle de Chincha.** 56 pp.; maps, diagr. *Bol. Cuerpo de Ingenieros de Minas del Perú No. 92.* Lima, 1918. [A study of the water supply and means of its distribution in one of the numerous oasis valleys of the coastal desert of Peru.]

REID, W. A. **Bolivia's railways—progress and prospects.** Maps, ills. *Bull. Pan Amer. Union*, Vol. 45, 1917, No. 4, pp. 478-496.

SAVILLE, M. H. **Some unpublished letters of Pedro de la Gasca relating to the conquest of Peru.** Ills., bibliogr. *Proc. Amer. Antiquarian Soc.*, Vol. 27, 1917, Part 2, pp. 336-357. Worcester, Mass.

SINGEWALD, J. T., JR., AND B. L. MILLER. **The mining industry of Peru.** Map, ills. *Engineering and Mining Journ.*, Vol. 101, 1916, No. 20, pp. 845-850. New York.

SUTTON, C. W. **Irrigation and public policy in Peru.** *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 3, Section 3: Conservation of Natural Resources, pp. 840-854 (discussion, pp. 850-854). Washington, D. C., 1917.

SUTTON, C. W., AND J. N. PORTOCARRERO Y C. **Informe preliminar sobre un proyecto para irrigar las Pampas de Chimbote.** 18 pp.; map. *Bol. Cuerpo de Ingenieros de Minas del Perú No. 91.* Lima, 1918. [In the Peruvian desert along the Pacific coast there is an excellent climate, the soil is productive, when watered, and communication by ocean routes is easy. Ruins of ancient canals show that irrigation was more extensive in pre-Columbian days than at present. The Peruvian government by means of such surveys as this is attempting to augment the area under cultivation. Sugar and cotton are the principal products.]

UMLAUFF, A. F. **La región sísmica de Caraveli.** Map, diagrs. *Bol. Soc. Geogr. de Lima*, Vol. 31, 1915, No. 3, pp. 223-257.

WALLE, P. **L'industrie du pétrole au Pérou.** *Bull. Soc. de Géogr. Commerc. de Paris*, Vol. 40, 1918, No. 4-5-6, pp. 91-99.

EUROPE

BRITISH ISLES

DAVISON, CHARLES. **The Ochil earthquakes of the years 1900-1914.** Diagrs. *Proc. Royal Soc. of Edinburgh*, Vol. 36, 1915-16, Part 3-4, pp. 256-287. [The Ochils are hills of volcanic rock which rise out of the Scottish lowland near its northern rift border.]

DEWEY, HENRY. **On the origin of some river-gorges in Cornwall and Devon.** Maps, diagrs., ills. *Quart. Journ. Geol. Soc.*, No. 285, Vol. 72, 1917, Part 1, pp. 63-76 (discussion, pp. 74-76). London.

FARROW, E. P. **On the ecology of the vegetation of Breckland: II, Factors relating to the relative distributions of Calluna-heath and grass-heath in Breckland; III, General effects of rabbits on the vegetation; IV, Experiments mainly relating to the available water supply; V, Observations relating to competition between plants; VI, Characteristic bare areas and sand hummocks.** Diagrs., ills. *Journ. of Ecol.*, Vol. 4, 1916, No. 2, pp. 57-64; Vol. 5, 1917, No. 1, pp. 1-18; No. 2, pp. 104-113; No. 3-4, pp. 155-172; Vol. 6, 1918, No. 2, pp. 144-152. London. [Part I was listed in the *Review*, Vol. 1, 1916, p. 388. Breckland is a heath district in East Anglia which "presents the nearest approach to continental steppe conditions to be found in Great Britain."]

FAWCETT, C. B. **Edale: A study of a Pennine dale.** Map, diagrs., ill. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 1, pp. 12-25.

FAWCETT, C. B. **Natural divisions of England.** Map. *Geogr. Journ.*, Vol. 49, 1917, No. 2, pp. 124-141 (discussion, pp. 135-141). [Abstracted, with map, in the February, 1919, *Review*, pp. 114-115.]

FAWCETT, C. B. **The Middle Tees and its tributaries: A study in river development.** Maps, diagrs. *Geogr. Journ.*, Vol. 48, 1916, No. 4, pp. 310-323.

HOSGOOD, BLANCHE. **Southern Forfarshire: A regional study.** Map, diagrs., bibliogr. *Scottish Geogr. Mag.*, Vol. 35, 1919, No. 1, pp. 15-29; No. 2, pp. 55-71.

INGLIS, H. R. G. **Early maps of Scotland and their authors (Maps in the Library of the Royal Scottish Geographical Society).** Maps. *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 6, pp. 217-230; No. 10, pp. 378-386; Vol. 35, 1919, No. 2, pp. 41-46. [The third instalment is accompanied by notes, by M. C. Andrews, on the earliest-known printed map of Scotland. See note in the April, 1919, *Review*, p. 266.]

JEFFREYS, HAROLD. **On the vegetation of four Durham coal-measure fells, III: On water-supply as an ecological factor.** Diagrs., ills. *Journ. of Ecol.*, Vol. 5, 1917, No. 3-4, pp. 129-154. London. [Parts I and II, although not so marked, make up the instalment listed under "Jeffreys" in the *Review*, Vol. 5, 1918, p. 251.]

MARR, J. E. **The geology of the Lake District and the scenery as influenced by geological structure.** xii and 220 pp.; maps, diagrs., ills., index. University Press, Cambridge, 1916. 12s. 9 x 6. [The student of geography will be interested in the discussion of the influence of geological structure and geological events upon the physical features of the region. Here are condensed descriptions of the great variety of topographic forms, originally due to ice action, which contribute to the beauty of a famous English "playground."]

MORT, FREDERICK. **The rivers of south-west Scotland.** Maps. *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 10, pp. 361-368.

NEWLANDS, ALEXANDER. **Water power in Great Britain (with special reference to Scotland): Its amount and economic value.** Map. *Journ. Royal Soc. of Arts*, No. 3401, Vol. 66, 1918, Jan. 25, pp. 168-188 (discussion, pp. 186-188). London. [With a map and statistical estimates.]

NEWNHAM, E. V. **The persistence of wet and dry weather.** Diagrs. *Quart. Journ. Royal Meteorol. Soc.*, No. 179, Vol. 42, 1916, pp. 153-161 (discussion, pp. 161-162). London. ["In this paper an attempt is made to analyze the rainfall records of several British stations with the help of modern statistical methods, in order to find out to what extent the tendency for wet and fine days or hours to occur in 'runs' can assist in forecasting rain in the near future."]

PEARSALL, W. H. **The aquatic and marsh vegetation of Esthwaite Water.** Maps, diagrs., bibliogr. *Journ. of Ecol.*, Vol. 5, 1917, No. 3-4, pp. 180-202; Vol. 6, 1918, No. 1, pp. 53-74. London.

RICHARDSON, RALPH. **The new Parliamentary division of Scotland, under the Representation of the People Act, 1918.** *Scottish Geogr. Mag.*, Vol. 34, 1918, No. 8, pp. 294-298.

SHAW, NAPIER. **Illusions of the upper air.** Map, diagrs., ills. *Proc. Royal Inst. of Great Britain*, No. 110, Vol. 21, Part III, 1918, pp. 603-624. [A discourse delivered March 10, 1916, reviewing the progress of meteorological theory in England since 1866. A report of it was published in *Nature*, Vol. 97, 1916, pp. 191-194 and 210-213. An extract also in *Scientific American Suppl.*, No. 2147, Vol. 83, 1917, Feb. 24, pp. 124-126.]

SMITH, WILLIAM G. **The distribution of *Nardus stricta* in relation to peat.** Map, ills., bibliogr. *Journ. of Ecol.*, Vol. 6, 1918, No. 1, pp. 1-13. London. [Refers to North Britain.]

STIRLING-MAXWELL, J. M. **Afforestation.** Ills. *Scottish Geogr. Mag.*, Vol. 33, 1917, No. 3, pp. 97-108. [In Britain.]

STRAHAN, AUBREY. **The search for new coal-fields in England.** Maps, diagrs. *Proc. Royal Inst. of Great Britain*, No. 110, Vol. 21, Part III, 1918, pp. 625-638.

WHITLEY, D. G. **The early tin trade of Cornwall according to Strabo's geography.** *Trans. Royal Geol. Soc. of Cornwall*, Vol. 13, 1914, Part X, pp. 595-610. Penzance. [An attempt to prove, from Strabo's description, that the Cassiterides of the Phenicians were the Scilly Islands. In Vol. 13, 1912, Part VIII, pp. 515-529, of the same publication the author discussed the statements of Herodotus and Himilco, the Carthaginian, relating to the same subject.]

—— **Wool, The command of (British).** *Journ. Royal Soc. of Arts*, No. 3375, Vol. 65, 1917, pp. 617-619. London.

YAPP, R. H., D. JOHNS, AND O. T. JONES. **The salt marshes of the Dovey Estuary.** Maps, diagrs., ills., bibliogr. *Journ. of Ecol.*, Vol. 4, 1916, No. 1, pp. 27-42; Vol. 5, 1917, No. 2, pp. 65-103. London.

BACON, G W. ***Bacon's commercial map of Great Britain showing all railways and stations, canals, navigable rivers, main roads & steamship routes.*** 1:554,400, or 8¾ miles to 1 inch. Insets: Birmingham, Bristol & Bath, Cardiff & Merthyr, Leeds & Bradford, Newcastle, Sheffield, each about 1 inch to 4 miles; Liverpool, Manchester, each about 1 inch to 3 miles; London, 1 inch to 2 miles. G. W. Bacon & Co., London, [1916]. [Valuable for its differentiation of railroad systems by colored symbols.]

GERMANY[1]

BALCH, T. W. **The question of Alsace and Lorraine.** 89 pp.; map, ills., bibliogr., index. Allen, Lane, & Scott, Philadelphia, 1918. 10 x 7.

The name of Alsace-Lorraine stands for more than a mere boundary rectification. It is symbolic of a principle which men of eastern and western nations have rushed to defend. Hence these pages, many of which are products of the author's personal observations, derive peculiar significance. But the importance of their subject matter is not their sole attraction. They are flooded with human sympathy and historical interest. The blend of these qualities makes the book a valuable one.

In a simple style Mr. Balch gives a picture of Alsace-Lorraine as he saw the provinces on the occasion of trips made within the past twenty years. His observations shed light on the failure of race or language to produce that feeling of kinship which we call nationality when ideals of civilization are at stake. He shows us that the natives had greater sympathy with France than with Germany simply because they were convinced, even though many of them spoke a Teutonic language or were Teutons, of the superiority of French standards.

As a problem of environmental influences the subject is of deep interest, perhaps because it can be examined with greater profit everywhere along debatable border zones. In this light Alsace-Lorraine represents a phase in the spread of democratic ideals in Europe. The geographer is reminded of the fact by the perusal of local descriptions such as are to be found in this book. Therein lies the value of the outsider's contribution to geography, and Mr. Balch well deserves credit for his share.

LEON DOMINIAN

ANFOSSI, GIOVANNI. **L'isola di Helgoland e l'erosione marina.** Map, diagrs., ills. *Boll. Reale Soc. Geogr.*, Vol. 5, 1916, No. 2, pp. 101-121. Rome.

BELLOC, HILAIRE. **The bridge-heads of the Rhine.** Maps. *Land and Water*, No. 2953, Vol. 72, 1918, December 12, pp. 3-6. London. [A discussion of the strategic value of these river crossings.]

BRECKWOLDT, JOHN. **Die hydrographischen Veränderungen in Schleswig-Holstein.** Map, bibliogr. *Schriften des Naturwiss. Vereins für Schleswig-Holstein*, Vol. 16, 1914, No. 1, pp. 44-164. Kiel.

CRONHEIM, PAUL. **De nieuwste kartelvorming in Duitschland.** *Tijdschr. voor Econ. Geogr.*, Vol. 7, 1916, No. 5, pp. 222-223. The Hague.

EICHLER, J., R. GRADMANN, AND W. MEIGEN. **Ergebnisse der pflanzengeographischen Durchforschung von Württemberg, Baden und Hohenzollern.** Maps. *Beilage zu Jahreshefte des Vereins für Vaterländische Naturkunde in Württemberg und Mitt. des Badischen Landesvereins für Naturkunde und Naturschutz*, Vol. 70, 1914, No. 6, pp. 317-388. Stuttgart.

FELS, EDWIN. **Der heutige Stand der Kenntnisse über die bayerischen Seen.** Bibliogr. *Mitt. der Geogr. Gesell. in München*, Vol. 9, 1914, No. 3, pp. 375-400.

FLEURE, H. J. **Berlin and its region.** 15 pp.; maps. Contributed as a basis for discussion to the Sociological Society (Cities Committee), [Oct., 1915]. Sherratt & Hughes, London, 1916. [Abstracted, with map, in the *Review*, Vol. 3, 1917, pp. 399-401.]

HELLMANN, G. **Häufigkeit und Dauer der Niederschläge.** *Meteorol. Zeitschr.*, Vol. 33, 1916, No. 9, pp. 391-398. Brunswick. [Relates to Germany.]

JAHN, MARTIN. **Die Bewaffnung der Germanen in der älteren Eisenzeit etwa von 700 v. Chr. bis 200 n. Chr.** x and 276 pp.; maps, diagrs., ills., bibliogr., index. (Mannus-Bibliothek, No. 16.) Curt Kabitzsch Verlag, Würzburg, 1916. M. 7. 10 x 7½.

[1] The territorial changes of the peace treaty will be taken into account in the next volume of the *Review*.—EDIT. NOTE.

KUNISCH, ERWIN. **Der Gardersee und Gr. Dolgensee. Mit einem Anhang: Ein Beitrag zur Kenntnis des Lebasees.** Maps, diagrs., ills., bibliogr. *Jahresbericht der Geogr. Gesell. zu Greifswald*, Vol. 13, 1911-12, pp. 149-233. [Two coastal lakes of Pomerania.]

LACHMANN, G. **Die Höhe der Schneedecke in Norddeutschland.** Maps. *Meteorol. Zeitschr.*, Vol. 33, 1916, No. 7, pp. 289-305. Brunswick.

LEVIN, EMIL. **Zur Klimatologie und Hydrologie des Peenegebietes (Abflussvorgang der Peene).** Map, diagrs., bibliogr. *Jahrbuch für die Gewässerkunde Norddeutschlands, Besondere Mitt.*, Vol. 2, 1914, No. 8, pp. 1-51. Preussische Landesanstalt für Gewässerkunde, Berlin. [The Peene, draining a number of small lakes in the Baltic moraine, flows eastwards into the Swinemünde lagoon.]

—— **Mitteilungen aus der Forst- und Kameralverwaltung für das Wirtschaftsjahr 1909.** Diagrs. *Beiträge zur Statistik des Grossherzogtums Hessen*, Vol. 61, 1911, No. 4, pp. 1-46; **Wirtschaftsjahr 1910**, Vol. 62, 1912, No. 2, pp. 1-43; **Wirtschaftsjahr 1911**, Vol. 62, 1913, No. 6, pp. 1-44; **Wirtschaftsjahr 1912**, Vol. 64, 1914, No. 1, pp. 1-48. Grossh. Hessische Zentralstelle für die Landesstatistik, Darmstadt.

MÜNS, R. **Über Ionisation und Radioaktivität der Atmosphäre in Kiel.** Diagrs., ill. *Schriften des Naturwiss. Vereins für Schleswig-Holstein*, Vol. 16, 1914, No. 1, pp. 1-43. Kiel.

MYLIUS, H. **Berge von scheinbar ortsfremder Herkunft in den bayerischen Alpen.** *Mitt. der Geogr. Gesell. in München*, Vol. 9, 1914, No. 3, pp. 435-478.

PRAESENT, HANS. **Die landeskundliche Literatur von Vorpommern und Rügen, 1906-1912.** *Jahresbericht der Geogr. Gesell. zu Greifswald*, Vol. 13, 1911-12, pp. 107-148.

SCHENK, RUDOLF. **Zur Oberflächengestaltung und Siedelungskunde des hessischen Riedes.** Maps, bibliogr. *Jahresbericht des Frankfurter Vereins für Geogr. und Statistik*, Vol. 77 and 78, 1912-13 and 1913-14, pp. 5-120. Frankfort on the Main, 1914. ["By the term 'Hessian Ried' is here meant the northern part of the Middle-Rhine graben valley which belongs politically to Hesse."]

VIDAL DE LA BLACHE, PAUL. **Exode et immigration en Alsace-Lorraine.** *Rev. des Sci. Polit.*, Vol. 35, 1916, June 15, pp. 308-318. Paris.

—— **Volkszählung, Die, im Deutschen Reiche am 1. Dezember 1910.** Part I: **Einleitung und Darstellung der hauptsächlichen Ergebnisse.** vii and 155 pp.; diagr. (Statistik des Deutschen Reichs, Vol. 240.) Berlin, 1915.

SCANDINAVIA

—— **Befolkningens fördelning efter yrke och näring i Helsingfors, Åbo, Viborg, Tammerfors, Nikolaistad, Björneborg, och Uleåborg, den 7 december 1910.** 48 and 68 pp. *Befolkningsstatistik*, No. 48, Vol. 6, 1916. Finlands Officiella Statistik, Helsingfors. [Population distribution according to occupation and trade.]

ENGSTRÖM, E. O. **Flodvågen i Dalälfven våren 1916.** 9 pp.; diagrs. Abstract from *Teknisk Tidskr., Väg- och Vattenbyggnadskonst*, 1916, No. 11. Hydrografisk Byrå, Stockholm, 1916. [Floods in the Dal Älf lake system, which discharges into the Gulf of Bothnia southeast of Gäfle in 60° 40′ N.]

—— **Finlands folkmängd den 31 december 1910 (enligt församlingarnas kyrkoböcker). Vol. 2: Den närvarande befolkningens fördelning efter yrke och näring.** 88 and 99 pp. *Befolkningsstatistik*, No. 47, Vol. 6, 1916. Finlands Officiella Statistik, Helsingfors. [Population of Finland according to parish registers: present distribution of the population according to occupation and trade.]

FRAHNE, CARL. **Das Wirtschaftsleben Schwedens. Ein Ueberblick auf statistischer Grundlage unter besonderer Berücksichtigung der deutsch-schwedischen Wirtschaftsbeziehungen.** 167 pp.; map, diagrs., bibliogr. Emil Ebering, Berlin, 1914.

GERAIN, LOUIS. **"L'évaluation de la mer" dans les eaux danoises.** Map. *La Géographie*, Vol. 31, 1916-17, No. 4, pp. 261-269. Paris. [Valuation from a biological point of view.]

GRÖNWALL, K. A. **De skånska stenkolsfälten och deras tillgodogörande.** Maps, diagrs., ills. Reprint from *Populär Naturvetenskaplig Revy*, 1915, No. 3-6, pp. 115-193. Sveriges Geologiska Undersökning, Stockholm. [The anthracite coalfields of Scania, Sweden, and their utilization.]

HILDEBRANDSSON, H. H. **Om de stundom om vintern förekommande våldsamma oststormarna från de norska fjällen.** Maps, diagr. *Ymer*, 1917, No. 1, pp. 36-49. [Winter storms.]

LA COUR, D. **Abnorme Vandstandsforhold i de danske Farvande. 1: Vandstandsforholdene den 15'-16' Januar 1916.** 83 pp.; maps, diagrs. *Dansk Meteorol. Inst. Meddelelser No. 4.* Copenhagen, 1917. [Abnormal water levels in the Danish fairways.]

—— **1914 års torka och dess inverkan på sjöarnas avlopp.** (La sécheresse de l'année 1914 et son influence sur l'écoulement des lacs.) *Hydrogr. Byrån Årsbok*, 1914, No. 6, pp. 25-72. Map, diagrs. Stockholm, 1917.

NORDÉN, ARTHUR. **Hällristningarnas kronologi och betydelse.** Ills. *Ymer*, 1917, No. 1, pp. 57-83. [Date and meaning of pictured rocks in Scandinavia.]

RABOT, CHARLES. **L'hiver 1917 dans la Scandinavie.** *La Nature*, No. 2273, 1917, Apr. 21, pp. 248-249. [Abstracted in the *Review*, Vol. 4, 1917, pp. 319-320.]

RABOT, CHARLES. **L'hiver de 1917 en Norvège et en Suède.** *La Géographie*, Vol. 31, 1916-17, No. 5, pp. 343-349. Paris.

STÖRMER, CARL. **Summary of results of the aurora-borealis expedition of 1913 to Bossekop, Norway.** Maps, diagrs. *Terrestr. Magnet. and Atmospher. Electr.*, Vol. 21, 1916, No. 4, pp. 157-168. Washington, D. C.

WALLÉN, AXEL. **Nederbördens och temperaturens inflytande på Dalälfvens vårhögvatten och vinterlågvatten.** Diagrs. Reprint from *Hyllningsskr. tillägnad J. G. Richert*, pp. 130-160. Hydrografisk Byrå, Stockholm, 1917. [Influence of rain and temperature on spring high water and winter low water of the Dal Älf lake system. See entry under "Engström," above.]

WALLÉN, AXEL. **Sveriges vattensystem.** 14 pp.; map, diagr., ills. Hydrografisk Byrå, Stockholm, 1916. (Abstract from "Sveriges Land och Folk," edited by J. Guinchard; see *Geogr. Rev.*, Vol. 1, 1916, p. 317.) [Hydrographic system of Sweden.]

WALLÉN, AXEL. **Vattenståndsförutsägelserna: Granskning af 1915 års resultat och prognoser för år 1916.** 21 pp.; map, diagrs. Abstract from *Teknisk Tidskr., Väg- och Vattenbyggnadskonst*, 1916, No. 3. Hydrografisk Byrå, Stockholm, 1916. [Water level prediction.]

AFRICA

GENERAL

Río JOAN, FRANCISCO DEL. **África Occidental Española (Sáhara y Guinea).** 391 pp.; maps, diagrs., ills., index. Ministerio de Estado, Sección Colonial, Madrid, 1915. 6½ x 9.

The author is an engineer of distinction in the Spanish service. He was sent to the Spanish African possessions in 1914 to report upon their conditions. His book is packed with information, criticism, and suggestion.

He found Fernando Po still unoccupied for any purpose. The island comprises about 550,000 acres, and only one acre in twenty-two is under cultivation. Cacao is the principal crop, but it is harvested from only a small part of the lands adapted for its cultivation.

The author sees no prospect that Rio de Oro, Spain's possession in the Sahara, will ever be important. There is some trading with the desert natives, who bring ostrich feathers to exchange for a few European commodities, and the coastal fishery has considerable value. He speaks of Rio Mumi, Spain's continental territory to the southwest of Fernando Po, as being scarcely known except along its boundaries. The fact is that the results of the primary surveys have not yet been published. The Spanish occupation has extended only along the coast and the lower courses of a few rivers. It will be remembered that when the Allies finally conquered Kamerun the Germans retreated into this Spanish territory, where they were not molested. A cartographic and statistical supplement accompanies the book. CYRUS C. ADAMS

BUXTON, NOEL. **The international factor in the African settlement.** *Contemporary Rev.*, No. 635, Vol. 114, 1918, November, pp. 513-520. London.

SHARPE, ALFRED. **The backbone of Africa.** Ills. *Geogr. Journ.*, Vol. 52, 1918, No. 3, pp. 141-157 (discussion, pp. 154-157). ["Survey of an imaginary journey . . . from the southern Indian Ocean to the Mediterranean."]

THIERRY, RENÉ. **L'Afrique de demain et le pangermanisme colonial.** *L'Afrique Française*, Vol. 28, 1918, No. 9-10, pp. 279-288. Paris.

CONGO BASIN AND LOWER GUINEA

SPRINGER, J. M. **Pioneering in the Congo.** xx and 312 pp.; map, ills. Methodist Book Concern, [New York], 1916. $1.00. 7½ x 5.

This book, by a missionary, is valuable from a geographical point of view because it contains much information as to the present economic development and the prospects of the large region between Lunda in the west and the great copper-mining region of Katanga in the east, roughly between 7° and 12° S. and 20° and 28° E. Mr. Springer observed a great change in the attitude of the Belgian government towards the natives, whose rights are now respected and whose welfare is promoted in striking contrast with the régime of the late King Leopold. Years ago that astute financier, Robert Williams, sent his prospectors 1,000 miles north of the railhead of the Cape-to-Cairo railroad to find the copper field that Livingstone had reported a generation before, now known as one of the greatest in the world. The two newspapers at Elizabethville, in this mining field, printed daily despatches on the European war, which were also sent forward by wireless to more remote regions. The whites in a large area of central Africa, south of the equator, are getting their morning news of European happenings earlier than we because they live so far east of us. The author has good grounds for his conviction that this large central area will have great development and that the natives will have their share in the work, not only as miners but also as farmers, craftsmen, and teachers.

CYRUS C. ADAMS

ASIA

RUSSIAN CENTRAL ASIA

FELL, E. N. **Russian and nomad: Tales of the Kirghiz Steppes.** xxvii and 201 pp.; ills. Duffield & Co., New York, 1916. $2.00. 8½ x 6.

It is a pity that Mr. Fell is not a geographer instead of a mining engineer. If he were a geographer he would have written a book which would take its place as a classic. Even without technical training in geography, and without any claim to writing a scientific treatise, he goes to the heart of the matter and gives one a deep glimpse into the very lives of the people.

Perhaps the best test of the value of a book is the number of times that one thinks of it after it is finished. The reviewer read Mr. Fell's book before the Russian situation had developed into Bolshevism. Since then he has thought of it again and again. Take these two quotations:

"Now there are two ways of carrying on the practical business of society; one is to assume that each individual is, in the nature of things, better suited than anybody else to take care of himself; and the other is to assume that there is, in the state somewhere far away in the distance, some personage, be he emperor or king or president, who is better able to take care of the individual than the individual himself. In Russia it was long ago decided by Ivan the Terrible or by Peter the Great or by some other personage of forceful character that the individual knows nothing at all of the way in which his business should be conducted."

"To the writer it seems that the Russian form of paternalism derives its force from below and not from above. It comes less from the desire of those in high authority to control the action of the masses than from the desire of the latter to impose on other shoulders than their own the responsibility of their actions. On the spiritual side, they rest their faith in God; on the practical side, they rely for guidance on some one in higher authority than themselves. The logical conclusion is: the authority of God in all things spiritual, and the authority of the 'Gosudar' (Czar) in all things temporal."

In these days when the fate of Russia is in the balance it is well to read books like this. In the fervor of the moment we think that Russia has changed. Perhaps that is true, but if Russia has changed, the *Russians* have not changed. Nor will they change for many generations.

Mr. Fell's book is by no means a philosophical treatise. On the contrary it is a delightful work of travel. The author lived in southern Siberia, not far from Lake Balkash, and was in charge of some large copper mines for a period of seven years or so. His book is a pleasant, chatty recital of his adventures among Russians and Kirghiz. He tells of sledge journeys with the thermometer thirty or forty degrees below zero; he vividly describes the beauty of the one month that can be called spring; and he speaks of a little pink flower which grows only in soil impregnated with copper and thus forms a sort of prospector's guide.

All through the book the Siberian winter keeps coming in as an undertone. "All winters are tedious when they are seven months long. The first dash of the frost giants over the hills in the autumn is inspiriting, and the first jangle of sleigh bells over the fresh snow makes the blood tingle, but before the first of May has come the fierce winds have swept bare the level places, and where the snow lies it is driven into ice drifts and glazed by the emery blasts of the ceaseless storms. The landscape looks tired and it is tired, and so are you. Your fur coat and felt overshoes are hateful burdens; the storm doors and windows oppress your house with an airless gasp; each year it seems as though spring were delayed and would never come."

Such conditions prevail in most parts of Russia. How much have they to do with the inertia which permits autocracy at one time and Bolshevism at another?

There is a brighter side to Mr. Bell's little book. It is the descriptions of the friendly, pleasant ways of both the Russians and the Kirghiz who work in the mines. To be sure, agitators who would now be Bolsheviki led them to strike and to be very unruly for a while, but that only makes a good story. On the whole, however, they are a most friendly folk, and one feels well acquainted with them when the book is laid down. The volume might well be longer. For example, it includes an account of a trip to Lake Balkash by Mrs. Vans Agnew, the daughter of Mr. Fell. That lake is so unfamiliar that her description is just enough to make one long for a fuller account of all the interesting life of the desert around its turquoise waters.

ELLSWORTH HUNTINGTON

AUSTRALASIA AND OCEANIA

AUSTRALIA, NEW ZEALAND

ANDERSSON, GUNNAR. **Australien, natur och kultur: Studier och minnen.** vii and 264 pp.; maps, diagrs., ills., index. Hugo Gerbers Förlag, Stockholm, [1916]. 7 kroner. 10 x 7.

Mr. Andersson deals with the possibilities of the fifth continent as a white man's land and its contribution to the world's sum of useful produce. The keynote of the book lies in the words: "The heroic deeds that form milestones in the history of Australia are not those of the battlefield. The heroes of Australia have waged their fight against thirst, against unending distances, against the wild silent forests where the eucalyptus formerly reigned undisputed lord of all. Their progress is marked by cleared ground, by millions and millions of sheep and cattle, by pleasant homes and rising cities."

The history of economic development in Australia is especially vital now in view of the inexhaustible supplies of food which that continent can pour into the depleted storehouses of the Old World. The author reminds us that Australia is only one and a quarter centuries old as a white man's land, and that it has a population of less than 5,000,000 in an area almost exactly equal to that of the United States. Yet the natural conditions are such as to demand the co-operative action usually found only in more closely settled communities.

Formerly the vast herds of sheep and cattle were utilized only for hides, wool, and tallow. In the sixties the canning industry was started; but the amount of meat that could be packed was wholly inadequate, and millions of carcasses still rotted in the bush while the poor people of Europe were famished. Finally, in the eighties, a process of freezing meat so that it could be transported across the ocean was perfected. Now great quantities of beef, mutton, and rabbit meat are frozen and exported, principally to England. (An illuminating picture is that of a farmer driving to the nearest freezing-plant with twelve hundred rabbits nailed to his wagon.) Australians have raised a monument to Thomas Sutcliffe Mort, who started the first experiment in freezing meat. Sheep in Australia in 1913 numbered over 83,000,000, the cattle about 10,500,000. The herds can be greatly increased, as the interior is made inhabitable. About 1,300 wells have been bored in the Great Artesian Basin in the northern and central part of the continent, and in this way it is possible to use for grazing vast stretches of land where the grass is nourishing but where lack of drinking water formerly kept out both men and animals.

Drought is the great enemy of the Australian farmer. In the eighties, an American firm, Chaffey Brothers, started the first artificial irrigation plants at two points on the Murray River, and this was the beginning of a rapid development. The great expense of the irrigation systems necessitates intensive farming, and the country in some sections is now divided into small farms and fruit ranches. The import and export of fruit are now about equal, but the export is rapidly gaining. The wheat area is being extended year by year from the western coast into the interior. The cultivation of concentrated fodder, principally alfalfa, makes it possible to keep two million cows where they can

be milked instead of roaming wild in the bush, and this is the beginning of an Australian dairy industry. Indeed there seems no limit to the possibilities of the southern continent as a food-producer.

Mr. Andersson has some interesting chapters on the early history of the country, its political development, the discovery and exploitation of the gold fields, and the recent social legislation. The volume is excellently bound and has over eighty valuable charts, maps, and pictures of more than ordinary attractiveness. HANNA ASTRUP LARSEN

HUNT, H. A., edit. **Results of rainfall observations made in South Australia and the Northern Territory, including all available annual rainfall totals from 829 stations for all years of record up to 1917.** 421 pp.; maps, diagrs. Bur. of Meteorol., Commonwealth of Australia, Melbourne, 1918. 10s. 6d. 12 x 9½.

The activity of the Australian Commonwealth Bureau of Meteorology is remarkable. A steady stream of important publications continues to flow to the reviewer's desk. Even the war brought no interruption, only delay. The present volume is one of a series, of which three numbers (New South Wales, Victoria, and Queensland) have already been issued, leaving two more still to come (Western Australia and Tasmania). In the issue before us we have tabulations of all the available annual totals of rainfall and of wet days for 829 stations—surely a very large number considering the area concerned—up to the year 1917. For about 200 stations there are also monthly totals to 1915. Such complete information for these sections of Australia has not before been embodied under one cover. Owing to delays due to the war the annual totals for 1916 and 1917 appear in supplementary form. In order to have the work complete for reference and for comparison, authentic annual (for the individual years 1878-1917) and also average annual and monthly rainfall and monthly rainfall maps are included. There are notes on the annual variation and monthly distribution of the rainfall, and a record of notable meteorological events. The incidence of the summer and winter rainfalls and the resultant wheat yields in South Australia are given special attention, the date being presented in both tabular and map form. The monthly and annual meteorological elements and normals for Adelaide and Darwin are given in appendixes.

This mere enumeration of the contents of the volume will serve to show how very complete and extensive is the information it contains. There is a remarkable abundance of excellent maps and of diagrams. While the details are of immediate concern only to those who are making special studies of Australian weather and climate, the volume is one which surely deserves mention in the *Review*. Those who, for one reason or another, have occasion to look up the rainfall conditions of the Australian Commonwealth will realize their lasting indebtedness to Mr. Henry A. Hunt and to his excellent staff of assistants and observers. R. DEC. WARD

BELTRÁN Y RÓZPIDE, RICARDO. **Juan Fernández y el descubrimiento de la Australia.** *Rev. de Geogr. Colon. y Mercantil*, Vol., 15, 1918, No. 8-10, pp. 347-362. Real Soc. Geogr., Madrid.

KOMOROWICZ, MAURICE VON. **Vulkanoseismische Studien im Norden Australasiens.** Diagrs., bibliogr. *Zeitschr. für Vulkanologie*, Vol. 2, 1916, No. 3, pp. 99-128. Berlin.

LEWIS, JOHN. **Our early pastoral possessions and the pioneers of settlement in South Australia.** Maps, ills. *Proc. Royal Geogr. Soc. of Australasia: South Australian Branch*, Vol. 17, 1915-16, pp. 8-92. Adelaide. [Presidential address.]

LEWIS, JOHN. **Some notes on the early navigation of the River Murray.** Map, ills. *Proc. Royal Geogr. Soc. of Australasia: South Australian Branch*, Vol. 18, 1916-17, pp. 2-104. Adelaide. [Presidential address.]

MORTENSEN, T. **Et besøg paa Auckland- og Campbell-Øerne.** Maps, ills. *Geografisk Tidskrift*, Vol. 23, 1916, No. 8, pp. 271-283. Copenhagen.

PARK, JAMES. **Pleistocene glaciation of New Zealand.** Ills. *Geol. Mag.*, Decade 6, Vol. 5, 1918, No. 9, pp. 394-397. London.

PICCOLI, L. L. **Lo sviluppo economico dell'Australia Occidentale.** *L'Esplorazione Commerc.*, Vol. 31, 1916, No. 11-12, pp. 425-435. Milan.

SCHLICH, WILLIAM. **Forestry in the Dominion of New Zealand.** *New Zealand Journ. of Sci. and Technol.*, Vol. 1, 1918, No. 4, pp. 201-210. Wellington.

SHUFELDT, R. W. **Captain White's recent exploratory work in Australia.** *Science*, No. 1144, Vol. 44, 1916, Dec. 1, pp. 793-795.

SLOANE, T. G. **On the faunal subregions of Australia.** Map. *Proc. Royal Soc. of Victoria*, Vol. 28, 1915, Part I, pp. 139-148. Melbourne.

ERRATA

p. 11, line 7 from bottom: *for* mysterions *read* mysterious.
p. 41, line 8: *for* thy *read* they.
p. 59, line 7 from bottom: *for* Trail *read* trail.
p. 61, line 8 from bottom: *for* Vol. 1 *read* Vol. 6.
p. 61, line 6 from bottom: *for* Vol. 6 *read* Vol. 1.
p. 118, line 14: *for* in United States *read* in the United States.
p. 140, at end of first paragraph: *add footnote, as follows:* Cf. also: W. D. McCrackan: The Sette Comuni: A Teutonic Survival on Italian Soil. *Bull. Amer. Geogr. Soc.*, Vol. 29, 1917, pp. 168-174.
p. 187, line 2 from bottom: *for* Psyslographers *read* Physlographers.
p. 192, line 17 from bottom: *for* Boucher *read* Bouchier.
p. 220, line 2 of footnote: *for* presented *read* present.
p. 263, line 2: *for* Navada *read* Nevada.
p. 268, line 1: *for* Stefansson *read* Stefánsson.
p. 273, line 22 from bottom: *for* Bénêvent, M. E., *read* Bénévent, E.
p. 275, lines 19 and 21 from bottom: *for* Cvjić *read* Cvijić.
p. 339, line 2 of footnote 1: *insert a comma after* Weather.
p. 351, line 3 of item Moffit, F. H.: *for* Rover *read* River.
p. 352, line 1 of item Merriam, J. C.: *for* palaentology *read* palaeontology.

ADDITIONAL ERRATA IN PREVIOUS VOLUMES
(Courtesy of C. E. Vail)

Vol. I

p. 53, line 2 from bottom: *for* cyanimide *read* cyanamide.
p. 54, lines 1 and 2: *for* cyanimide *read* cyanamide.
p. 78, line 2: *for* Calendonia *read* Caledonia.
p. 115, line 6: *for* stream *read* steam.
p. 171, line 1 of legend under map: *for* 1:12,000,000 *read* 1:10,700,000.
p. 231, line 6: *for* suspended *read* suspected.
p. 231, line 17: *for* insiduous *read* insidious.
p. 231, line 24: *for* was *read* were.
p. 300, line 8 from bottom: *for* slat *read* salt.
p. 305, line 28 from bottom: *for* 106° *read* 10.6°.
p. 422, line 27: *for* subsistance *read* subsistence.
p. 462, line 33: *for* aggradional *read* aggradational.
p. 469, line 25 from bottom: *for* 757-797 *read* 427-475.
p. 496, col. 2, last line: *for* peneplains *read* peneplanes.

Vol. II

p. 14, line 20 from bottom: } *for* reconnaisance *read* reconnaissance.
p. 23, line 17: }
p. 30, line 8: *for* Servia *read* Serbia.
p. 83, line 8: *for* manufacturers *read* manufactures.
p. 96, line 22 from bottom: *for* places *read* place.
p. 112, line 6 from bottom: *for* foliatious *read* foliaceous.
p. 149, line 1 of footnote 81: *for* Gibbons *read* Gibbon.
p. 214, line 18: *for* lines *read* line.
p. 243, line 16: *for* face *read* faces.
p. 291, Table III, col. 2, line 1: *for* Alllelarkean *read* Allelarkean.
p. 303, line 6: *for* tracks *read* tracts.
p. 307, last line: *for* Consantinople *read* Constantinople.
p. 499, col. 2, line 3: *for* Ergebenisse *read* Ergebnisse.
p. 500, col. 1, line 7: *for* Audrews *read* Andrews.
p. 500, col. 1, line 13: *for* Erklarung *read* Erklärung.

Vol. III

p. 21, line 4: *for* from *read* form.
p. 57, line 2 from bottom: *for* helflike *read* shelflike.
p. 147, line 29: *for* reconnaisance *read* reconnaissance.
p. 159, line 3 from bottom: *for* supplement *read* supplements.
p. 198, Table III, col. 2, sub.-col. D, heading: *for* EXCEEDS C *read* EXCEEDS A.
p. 198, Table III, col. 3, sub.-col. D, heading: *for* EXCEEDS C *read* EXCEEDS A.
p. 329, line 7 from bottom: *for* Am. *read* Ann.
p. 392, line 5 from bottom: *for* Hrdlicka *read* Hrdlička.
p. 393, line 6 from bottom: *for* Pockocke *read* Pococke.
p. 410, lines 4 and 5: *for* adaptions *read* adaptations.
p. 493, line 7 from bottom: *for* Wedel *read* Weddel.
p. 534, col. 1, line 27: *for* Gunsaulaus *read* Gunsaulus.

THE GEOGRAPHICAL REVIEW

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OUR CONTRIBUTORS

Baron Nordenskiöld is a well-known Swedish archeologist and ethnologist who has traveled extensively in Bolivia and in other parts of South America. Among his numerous published writings are books on the culture history of the South American Indian (1912), Indian life in the Gran Chaco (1910), and on the Indians and whites of northeastern Bolivia. He is curator of ethnography at the Göteborg Museum. Baron Nordenskiöld comes of a family whose members have contributed much to the sciences of the earth and of man. His father, Baron Adolf Erik Nordenskiöld, was the first to accomplish the Northeast Passage (in the *Vega* in 1878-80); his brother, the late Gustaf Nordenskiöld, is known for the archeological investigations embodied in his "The Cliff Dwellers of the Mesa Verde" (Stockholm, 1893); and his cousin, Otto Nordenskjöld, is the well-known polar geographer, professor of geography at the University of Göteborg.

Mr. Belden has motored extensively in the scenic regions of the West and abroad. He has written "Motoring Among the Mountains" (*Outing*, Aug., 1915); "Motoring in the High Sierras" (*Scribner's Magazine*, Feb., 1915); "The Motor in the Yellowstone" (*ibid.*, June, 1918); "A Hive City of the Libyan Desert" (*Travel*, Dec., 1916); and "An American Motorist in the Land of the Czar." His home is at Pitchfork, Park County, Wyoming, on the upper Grey Bull River, at the eastern foot of the Absaroka Range.

Mr. Ross made the observations described in the present article while in Liberia on behalf of the Christian Woman's Board of Missions of Indianapolis. He is at present associated with the Disciples of Christ Congo Mission and is stationed at Bolenge near Coquilhatville on the Congo at the equator.

Mr. Bent is chairman of the Publishing Committee of the Appalachian Mountain Club and has been librarian and corresponding secretary. He has written "Early American Mountaineers" (1913), "The Indians and the Mountains" (1915), "The Mountaineering Clubs of America" (1916), "The Literature of Mountain Climbing in America" (1918), and several other articles for *Appalachia* and has compiled a "Bibliography of the White Mountains" (1911). He is a member of the American Alpine Club and the Alpine Club of Canada and has camped and climbed with the latter and with the Sierra Club of California and the Mazamas of Portland, Oregon. His ascents include the highest peak in each of the states of California, Colorado, Washington (all three over 14,000 feet), Oregon, and New Mexico, and many peaks in the Canadian Rockies and Selkirks.

Professor Davis is the leading exponent of physiography, or the rational study of land forms; to his teachings is mainly due the universal recognition of America's pre-eminence in this science. Among his numerous writings may be mentioned "Physical Geography" (1898); "Geographical Essays" (1909); "Die erklärende Beschreibung der Landformen" (1912), written while exchange professor at the University of Berlin in 1908-09. In 1911-12 he was visiting professor at the University of Paris. In the latter year he conducted the American Geographical Society's Transcontinental Excursion across the United States. Professor Davis is Sturgis-Hooper Professor of Geology, Emeritus, at Harvard University.

ARTICLES ON THE GEOGRAPHY OF THE WAR
published in the Geographical Review

The Great Russian Retreat. By D. W. JOHNSON. (25 pp.; with 6 maps and 6 photographs.) *February, 1916.*

The Balkan Campaign. By D. W. JOHNSON. (21 pp.; with 1 map and 4 photographs.) *July, 1916.*

The Conquest of Rumania. By D. W. JOHNSON. (19 pp.; with 1 map and 3 photographs.) *June, 1917.*

In these three articles Professor Johnson discusses the influence of geographical conditions on the military campaigns in the areas affected. The second deals with the campaign against Serbia at the end of 1915. Each article gives an outline of the physical features of the area discussed and is illustrated by maps showing the positions of the battle lines at various critical junctures.

The Military Campaigns Against Germany's African Colonies. By G. M. WRIGLEY. (22 pp.; with 5 maps.) *January, 1918.*

The more pronounced control of geographic conditions in the African as compared with the European campaigns, because of the larger areas affected and the greater dependency here of man on nature, is clearly brought out in this article. The campaign in each colony is illustrated by a map indicating the troop movements in relation to the topography. The article is accompanied by a full bibliography.

Europe at Turkey's Door. By LEON DOMINIAN. (9 pp.; with 2 maps.) *April, 1916.*

Discusses the claims of the European powers to Turkish territory, based on political and economic grounds. Illustrated by a separate map showing the spheres of influence and territorial claims in Asiatic Turkey of Russia, England, France, Greece, and Italy.

The Future of Palestine. By ELLSWORTH HUNTINGTON. (12 pp.; with 1 map.) *January, 1919.*

A discussion of the economic and social as well as the political future of Palestine.

The Geographical Distribution of the Balkan Peoples. By JOVAN CVIJIĆ. (17 pp.; with 1 insert map in color.) *May, 1918.*

An article by the foremost geographer of Serbia. The accompanying colored map shows the distribution of nationalities and creeds in detail.

The Zones of Civilization of the Balkan Peninsula. By JOVAN CVIJIĆ. (13 pp.; with 1 insert map in color.) *June, 1918.*

Discusses the growth and present distribution (shown on colored map) of the two main forces, Old Balkan (modified Byzantine) civilization and the patriarchal régime, and the subsidiary influences, Turco-Oriental, Italo-Mediterranean, Mediterranean, Central European, Western European.

The Ethnography of the Yugo-Slavs. By MILIVOY S. STANOYEVICH. *February, 1919.*

A brief account of the Southern Slavs, not including the Bulgarians.

The Balkans, Macedonia, and the War. By H. CHARLES WOODS. (18 pp.; 1 map and 10 photographs.) *July, 1918.*

Albania and the Albanians. By H. CHARLES WOODS. (17 pp.; with 1 map and 8 photographs.) *April, 1918.*

Discussions of the politico-geographical problems by a first-hand observer of the country and its people.

The Regions of Mixed Populations in Northern Italy. By OLINTO MARINELLI. (20 pp.; with 1 insert map in color.) *March, 1919.*

A well-balanced discussion of the whole landward contact zone of the Italians from the Riviera to the Quarnero, accompanied by an original ethnographic map in color, 1:1,500,000.

Russia's War-Time Outlets to the Sea. (5 pp.; with 1 map.) *February, 1916.*

Deals with the closing of the Baltic and Black Sea outlets to Russia by the war and her circumvention of this obstacle, especially by the construction of a railroad to Kola, an ice-free port on the Arctic Ocean. With map.

The Economic Resources of the Russian Empire. By E. K. REYNOLDS. (17 pp.; with 1 map and 10 photographs.) *April, 1916.*

Accompanied by a map showing the distribution of the main economic resources of both European and Asiatic Russia.

German Colonization in Eastern Europe. By JEAN BRUNHES and CAMILLE VALLAUX. (16 pp.; with 1 map.) *December, 1918.*

An account of German colonization in the Baltic Provinces (through social control) and the Ukraine (economic colonization).

(Continued on next page)

The Finn in America. By EUGENE VAN CLEEF. (30 pp.; with 5 maps and 13 photographs.) *September, 1918.*

In this study of the effects of transference to an environment physically similar yet politically unlike their old home light is shed on the perplexing problems facing this deserving people in Europe as a result of the war.

The Racial History of the British People. By H. J. FLEURE. (16 pp.; with 2 maps.) *March, 1918.*

A geographical exposition of the early racial movements which led to the settlement of Britain and their reflection in the composition of the present-day population.

Flanders. By RAOUL BLANCHARD. (17 pp.; with 2 maps and 9 photographs.) *December, 1917.*

A summary of the geography, physical and human, of one of the most important battle areas of the war.

Alsace-Lorraine and Europe. By LUCIEN GALLOIS. (27 pp.; with 1 insert map in color and 5 photographs.) *August, 1918.*

An exposition of the geographical basis of Alsace-Lorraine's attachment to France. Accompanied by a colored map showing relation of mineral resources to territorial changes.

The Peoples of Hungary: Their Work on the Land. By B. C. WALLIS. (17 pp.; with 8 maps.) *December, 1917.*

The Peoples of Austria. By B. C. WALLIS. (14 pp.; with 5 insert maps in color.) *July, 1918.*

Discussions of the human geography of the two states, with special attention to the problem of nationalities. Two of the accompanying maps in each article, representing by a new method the population density and distribution of nationalities, are especially valuable.

(1) The Rumanians in Hungary; (2) The Slavs of Northern Hungary; (3) The Slavs of Southern Hungary; (4) Central Hungary: Magyars and Germans. By B. C. WALLIS. (16, 14, 13, and 15 pp., each with 1 text map, 3 insert maps in color, and 1 diagram.) *August, September, October, November, 1918.*

A series of four articles discussing in detail the human geography of the four parts into which Hungary may be divided by nationality groups. The articles are accompanied by colored maps which can be combined to form three maps of the whole of Hungary, showing relief, nationalities, and population density.

The Carpathians: Physiographic Features Controlling Human Geography. By EMMANUEL DE MARTONNE. (21 pp.; with two text maps, 1 insert map in color, 3 diagrams, and 10 photographs.) *June, 1917.*

A general account, illustrated by a colored physiographic map, of the interrelations of the physical features and human life, many of which had a bearing on the military operations of the war in this area.

Poland: The Land and the State. By EUGENIUSZ ROMER. (20 pp.; with 12 maps.) *July, 1917.*

A geographical interpretation of Poland's history and development and an exposition of her essential geographical unity. The article is accompanied by ten black-and-white maps illustrating the racial and territorial development of Poland from 800 to 1795.

Spitsbergen, *Terra Nullius*. By R. N. RUDMOSE BROWN. (11 pp.; with 1 map.) *May, 1919.*

A discussion of the exploration, economic development, and present anomalous political status of this Arctic archipelago.

The New Boundaries of Germany According to the Peace Treaty. (10 pp.; with 1 insert map.) *May, 1919.*

Principles in the Determination of Boundaries. By ALBERT PERRY BRIGHAM. (19 pp.) *April, 1919.*

Aëronautical Charts. By OMAR B. WHITAKER. (5 pp.; with 2 maps.) *July, 1917.*

Aëronautical Maps and Aërial Transportation. By HENRY WOODHOUSE. (22 pp.; with 4 maps, 3 drawings, and 5 photographs.) *November, 1917.*

European War Maps. By W. L. G. JOERG. (4 pp.) *July, 1917.*

The first two articles discuss a phase of mapping of high importance in the development of the airplane. They are illustrated by reproductions of aëronautical maps used in this country and in Europe. The second article also deals with the commercial possibilities of aëronautics in the immediate future. The third article gives a selected list of maps, detailed topographic sheets as well as general maps, of use in following the military operations in Europe.

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